APPENDIX L
ARCHEOLOGICAL SURVEY OF BAYPORT LOOP RAIL PROJECT HARRIS COUNTY, TEXAS

ARCHEOLOGICAL SURVEY OF BAYPORT LOOP RAIL PROJECT, HARRIS COUNTY, TEXAS

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ABSTRACT

Between December 18, 2001 and January 29, 2002 and again between February 12, 2002 and June 5, 2002, crews from Moore Archeological Consulting, Inc. performed shovel testing and pedestrian survey of the proposed Bayport Rail Loop preferred alignment and 10 alternative alignments in southeastern Harris County, Texas. In total, 183 shovel tests were excavated. One previously recorded historic site was found. No prehistoric sites were found during survey of the preferred alignment and the alternative alignments. The recommendation of Moore Archeological Consulting is that this project should proceed without further investigation.

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INTRODUCTION

Between December 18, 2001 and January 29, 2002, and again between February 12, 2002 and June 5, 2002, Moore Archeological Consulting, Inc., of Houston, Texas conducted an archeological survey of a Preferred Alignment and 10 alternative alignments for the proposed Bayport Rail Loop Project in southeast Harris County, Texas. The investigations were conducted for ICF Consulting and will be subject to review by the Texas Historical Commission and the United States Surface Transportation Board.

The purpose of the investigation is to determine the presence or absence of cultural materials within the various proposed Bayport Rail Loop alignments. It will also assess any potentially impacted archeological sites and provide recommendations regarding mitigation measures if any are necessary.

The Project Area is in the southwest part of the city of Houston, Texas (Figure 1). The project corridors consists of approximately 73.5 kilometers of proposed railroad tracks split between one preferred alignments (20.368 kilometers) and 10 alternatives (adding up to approximately 53 kilometers). The overall project area is bounded by State Highway 3 and the Sam Houston Parkway to the west, State Highway 225 to the North, State Highway 146 and Galveston Bay to the east, and a line running east to west through Clear Lake City to the south. The alignments run from the intersection of the Sam Houston Parkway and State Highway 3 in the west to State Highway 146 in the east, and from State Highway 225 in the north to the south side of Ellington Field and Seabrook in the south (Figure 2).

During survey of Alignment 1 (the Preferred Alignment) the crew excavated 169 (30 x 30 centimeter) shovel tests at preset intervals as described in the METHODS section of this report. Project Archeologists Joe Sanchez, along with Crewmembers Raven Garvey, Mark Carper, Darren Schubert, and Kelly Schexnayder, conducted the investigation of Alignment 1 (Figure 3).

After survey of the Preferred Alignment was completed there was a delay in determining the likely routes of potential alternative alignments. During this delay the original survey strategy was reevaluated based on the results of the initial fieldwork and examination of aerial photographs and the county soil manual. It was determined that a scaled back methodology should be adopted to account for large segments of the alignments that are already disturbed by urbanization and large scale industrial activities prevalent within the Project Area. Concurrence for this revised scope of work was received from the Texas Historical Commission on March 14, 2002 (Appendix A).

Project Archeologist Douglas G. Mangum and Crewmembers Brett Lowry and Kelly Lackey investigated the alternative alignments (1a, 1b, 1c, 2, 2a, 2b, 2c, 2d, 3, & 4). All explorations of the preferred alignment and all alternative alignments were performed under the supervision of the Principal Investigator, Roger G. Moore.

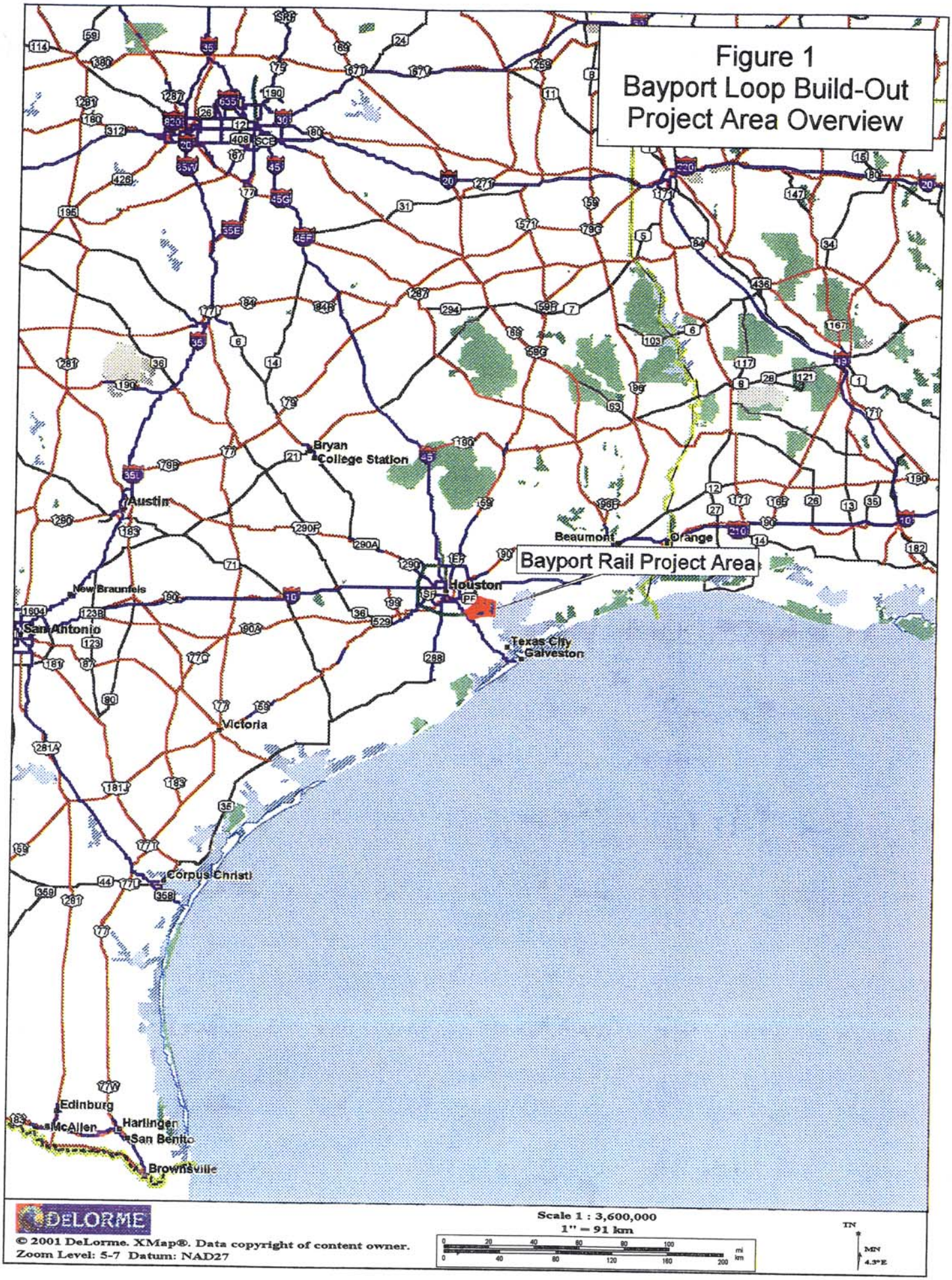
Figure 1
Bayport Loop Build-Out
Project Area Overview
Bryan
College Station
Austin
Houston
Bayport Rail Project Area
Beaumont
Orange
New Braunfels
San Antonio
Texas City
Galveston
Victoria
Corpus Christi
Edinburg
McAllen
Harlingen
San Benito
Brownsville
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1" = 91 km
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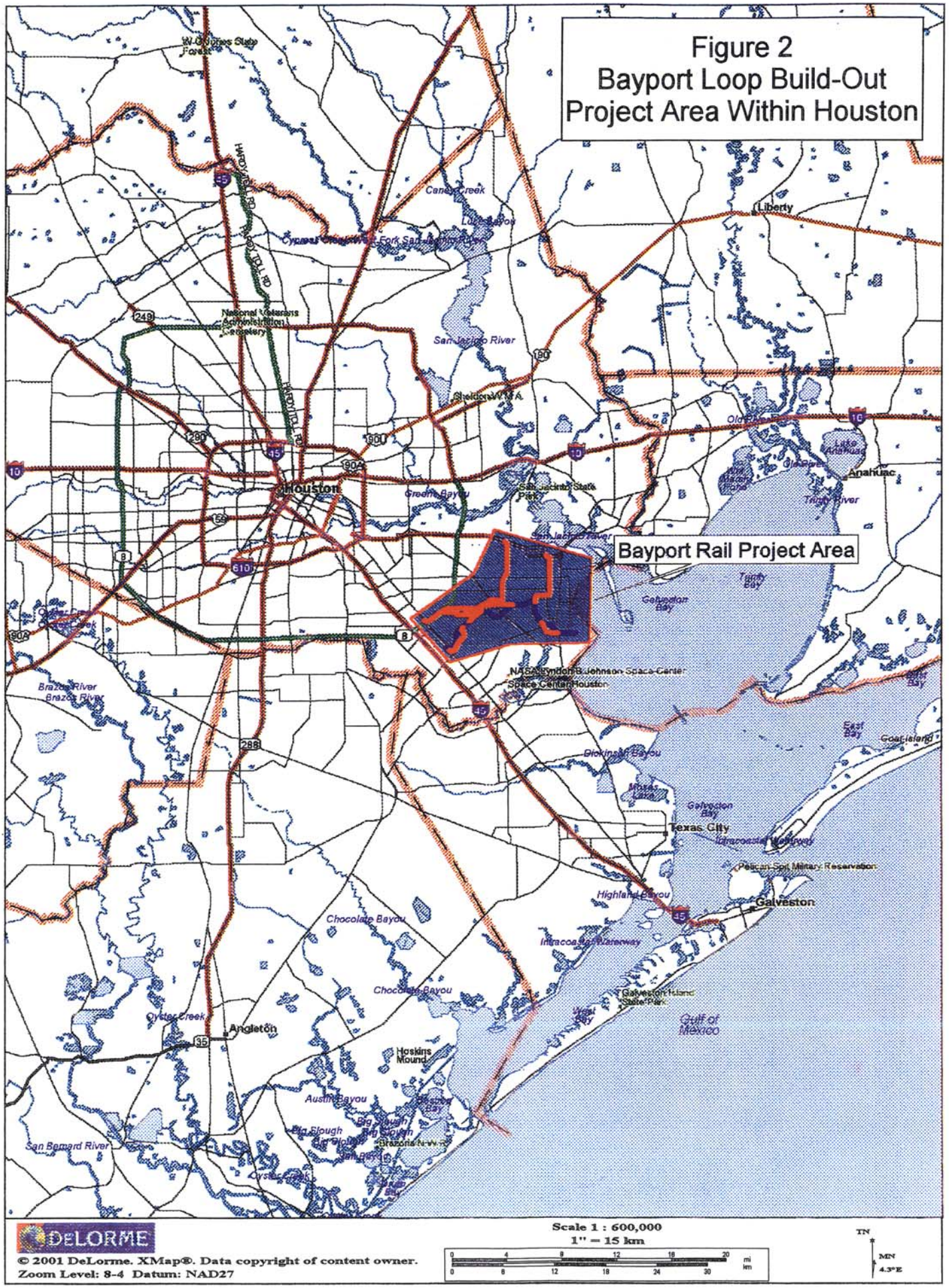
Figure 2
Bayport Loop Build-Out
Project Area Within Houston
Bayport Rail Project Area
Houston
Liberty
Anahuac
Texas City
Galveston
Angleton
Hoskins Mound
Gulf of Mexico
Galveston Bay
Trinity Bay
East Bay
Chocolate Bayou
Oyster Creek
Brazos River
San Bernard River
Scale 1 : 600,000
1" = 15 km
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Zoom Level: 8-4 Datum: NAD27

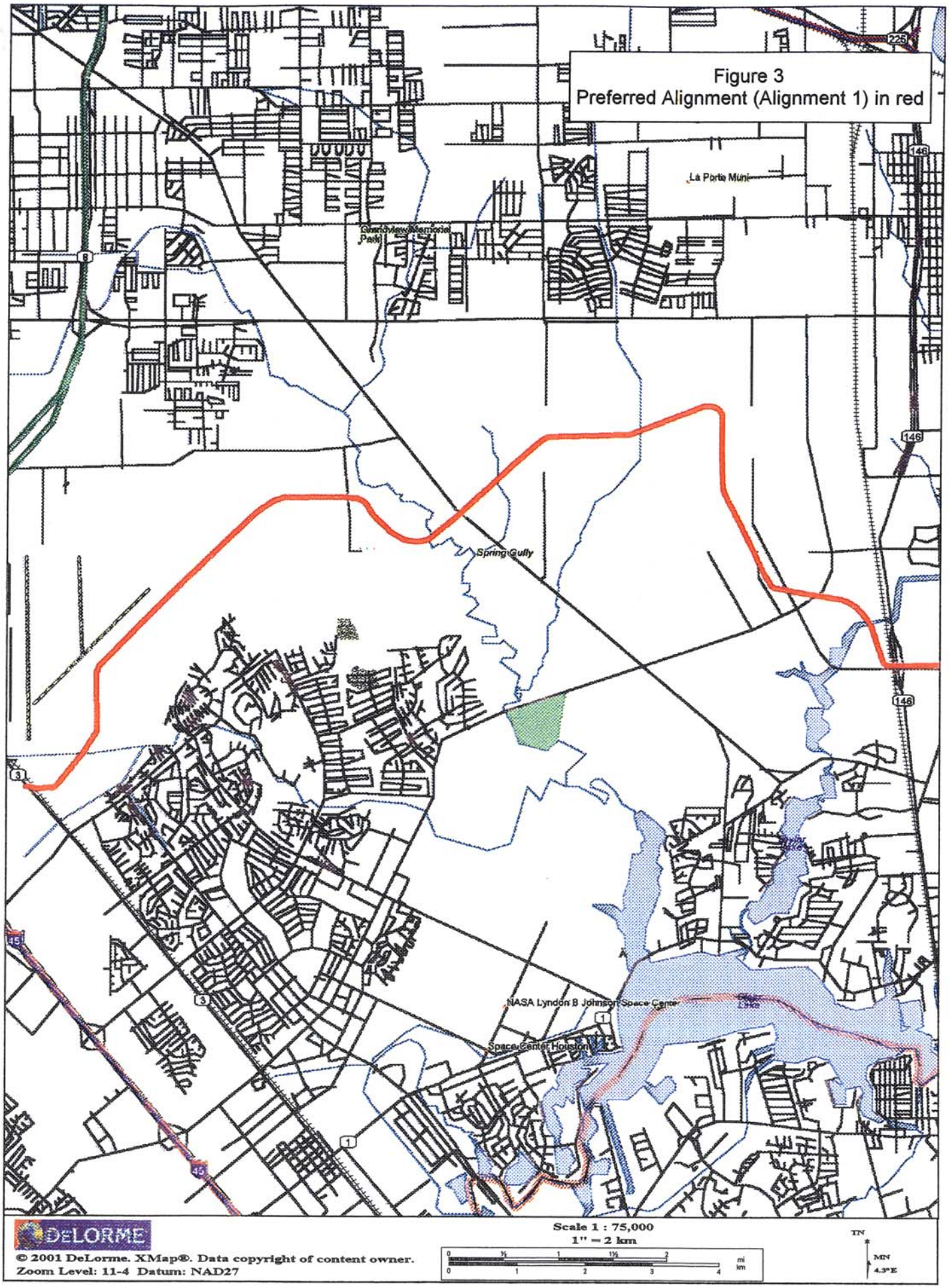
Figure 3
Preferred Alignment (Alignment 1) in red
La Porte Muni
Greenview Memorial Park
Spring Gully
NASA Lyndon B Johnson Space Center
Space Center Houston
DeLORME
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Zoom Level: 11-4 Datum: NAD27
Scale 1 : 75,000
1" = 2 km
TN
MN
4.3°E

ENVIRONMENTAL SETTINGS

Modern Climate

The modern climate of the Study Area can aptly be characterized as hot and wet for most of the year. The mean annual temperature for the Study Area region is about 20 degrees Centigrade, with mean rainfalls of 117 centimeters. Summer temperatures average about 34 degrees Centigrade with temperatures above 38 degrees Centigrade common, during the months of July and August (Carr 1967; St. Clair *et al*. 1975). The average winter temperature is a mild 18 degrees Centigrade. Freezes are infrequent and of short duration, with an average of 271 frost-free days per year. Snow, sleet, and freezing rain are quite uncommon.

Rainfall varies from 7 centimeters in March to 11 centimeters in December, with July to December rainfalls often supplemented by tropical fronts and storms. The rainfall records are 45 centimeters in 1917 and 185 centimeters in 1917. Prevailing winds are usually from the southeast except during the winter months when 'Northers' sweep into the area.

Modern Flora and Fauna

Southeast Texas is within the Austroriparian biotic province as defined by Blair (1950:98-101), near its western boundary with the Texan province. This boundary is marked by the western edge of the pine-hardwood forests of the eastern Gulf coastal plain with this boundary set by available moisture levels. The southeast Texas Study Area is situated within the pine-oak forest subdivision of the Austroriparian province and includes, within its western limits, portions of the coastal prairie (Tharp 1939).

Grasses within the coastal prairies and marshes vegetational area are described from a range-management perspective in Hoffman *et al.* (nd: 45). This 4,040,000 hectare (10,000,000-acre) area is comprised of 3,838,000 hectare (9,500,000 acres) of Gulf Prairies and 500,000 acres of Gulf Marshes situated along the Texas coast. The regional vegetation of the coastal prairies is characterized as follows:

> The principal grasses of the prairies are tall bunchgrass, including big bluestem *(Andropon gerardi),* little bluestem, seacoast bluestem *(Schizachyrium scoparium,* var. *littorus),* Indiangrass, eastern gamagrass *(Tripascum dactyloides),* switchgrass, and gulf cordgrass. Seashore saltgrass is common on moist saline sites. Grazing pressures have changed the composition of the range vegetation so that the grasses now existing are broomsedge bluestem, smutgrass, threeawns, tumblegrass and many other inferior grasses. The other plants that have invaded the productive grasslands are oak underbrush, mcartney rose, huisache, mesquite, pricklypear, ragweed, bitter sneezeweed, broomweed, and many other unpalatable annual weeds.

The dominant floral species of the pine-oak forest subdivision of the Austroriparian biotic province include loblolly pine *(Pinus taeda),* yellow pine *(Pinus echinata),* red oak *(Quercus rubra),* post oak *(Quercus stellata)* and blackjack oak *(Quercus marilandica).* Hardwood forests are found on lowlands within the Austroriparian and are characterized by such

trees as sweetgum *(Liquidambar styrciflua),* magnoila *(Magnolia grandiflora),* tupelo *(Nyssa sylvatica),* water oak *(Quercus nigra)* and other species of oaks, elms, and ashes, as well as the highly diagnostic Spanish moss *(Tillandsia usneiodes)* and palmetto *(Sabal glabra).* Swamps are common in the region.

Blair (1950) and Gadus (Gadus and Howard 1990:12-15) define the following mammals as common within the Austroriparian province: white-tailed deer *(Odocoileus virginianus),* muskrat *(Ondatra zibethicus),* raccoon *(Procyon lotor),* coyote *(Canis latrans),* opossum *(Didelphis virginiana), Scalopus aquaticus, Pipistrellus subflavus, Lasiurus borealis, Sciurus niger, Sciurus carolinensis, Glaucomys volans, Geomys breviceps, Reithrodonomys fulvescens, Peromyscus leucopus, Oryzomys palustris,* cotton rat *(Sigmodon hispidus,),* packrat *(Neotoma floridana),* eastern cottontail *(Sylvilagus floridanus),* and swamp rabbit *(Sylvilagus aquaticus.).* Bison *(Bison bison)* may have been present on nearby grasslands at various times in the past (Gadus and Howard 1990:15).

Common land turtles include eastern box turtle *(Terrapene carolina)* and *Terrapene ornata*, while snapping turtle *(Chelydra serpentinia),* mud turtle *(Kinosteron spp.),* river cooter *(Chrysemys concinna)* and diamondback terrapin *(Malaclemys terrapin)* comprise common water turtles. Common lizards include *Anolis carolinensis, Sceloporus undulatus, Leiolopisma laterale, Eumeces laticeps, Cnemidophorus sexlineatus* and *Ophiosaurus ventralis*. Snakes and amphibians are also present in considerable numbers and diversity.

The resources provided by river-influenced estuarine and marsh environments were undoubtedly of great importance to the littoral residents of southeast Texas. These resources are admirably summarized by Gadus (Gadus and Howard 1990: 12 - 15). Estuarine fish resources cited by Gadus include sand trout *(Cynoscion arenarius),* spotted sea trout *(Cynoscion nebulosus),* Atlantic croaker *(Micropogon undulatus),* striped mullet *(Mugil cephalus),* southern flounder *(Paralichthysis lethostigma),* shortnose gar *(Lepisosteus platostomus),* channel catfish *(Ictalurus punctatus),* freshwater drum *(Aplodinotus grunniens),* red drum *(Sciaenops ocellata),* and bluegill *(Lepomis macrochirus)* and other sunfishes. Common shellfish include Rangia *(Rangia cuneata), Macoma* spp., dwarf surf clam *(Mulinia lateralis),* oyster *(Crassostrea virginica), Vioscalba louisianae*, and olive nerite *(Neritina [Vitta] reclivata).* Arthropods such as shrimp and crab are also numerous and highly productive.

Area marshes replete with plants such as cordgrasses *(Spartina spp.),* reeds *(Phragmites spp.)* giant millet *(Setaria magna)* and bullrushes *(Scirpus spp.)* would have formed a highly attractive and bountiful magnet for waterfowl (Gadus and Howard 1990).

Soils and Geology

The segment of the Texas Gulf Coast that encompasses the current study area is on soils laid down primarily over the last million to two million years. It sits on the Beaumont Formation, a band of alluvial deltaic soils running parallel to the coastline that was laid down during a series of glacial and interglacial intervals during the Middle to Late Pleistocene epoch. Downcutting and erosion processes during the most recent glacial period incised and widened many of the river drainages running through the Beaumont Formation. After the sea levels rose

again, during the Holocene, these river valleys then filled with alluvial soils and created broad, level floodplains.

The soils of in this Project Area are found on sheets 116-118, 125-127, and 132-134 of the Soil Survey of Harris County, Texas (Wheeler 1976). The major soil groups along the various alignments are Lake Charles clay, Beaumont clay loam, Midland silty clay loam, and Bernard clay and the Bernard Edna complex soils. There are also smaller pockets of Addicks loam and Vamont clay within the Project Area. All these soils are poorly drained or somewhat poorly drained and they are level, nearly level, or gently sloping. All are considered to have a low geoarcheological probability (Abbot 2001). Pimple mounds are evident in the Bernard-Edna complex and the Clodine soils.

The Project Area is part of the coastal prairie environment. This landscape is generally flat to gently rolling. Elevation change within the Project Area is mild. It ranges from a high of 40 feet above sea level at Beltway 8 to a low of five feet above at the bridge crossings at Taylor Bayou. This amounts to a little over 2.5 feet of elevation change per kilometer of the 13.5-kilometer distance between these two locations. Field observations confirmed the generally flat nature of the ground surface within the Project Area. Exceptions to this trend were confirmed to be of human origin, such as one location along Alignment 3 which had a raised pad consisting entirely of fill soils. Natural exceptions included the stream cuts (some of these had been deepened and widened by human activity) and the "pimple mounds" (defined later) found within some areas where the Bernard-Edna complex or Clodine were the dominant soils.

Hydrology

The major drainages include the Taylor Bayou, Armand Bayou, Willow Spring, and Big Island Slough. The project Area also includes close approaches to San Jacinto Bay and Galveston Bay (approximately 1 mile to both). There are numerous smaller bayous, creeks and drainage ditches of various classes throughout the corridor. Among the largest of these are Little Vince bayou, Horsepen Bayou, Little Cedar Bayou, and Spring Gully. Most of these bayous and streams have long been modified by channeling in order to suit storm drainage and irrigation needs. Only Taylor and Armand Bayous appear mostly in their original form where the various alignments cross them. There are also numerous drainage ditches crisscrossing the entire Project Area. Some of these appear on USGS quadrangle maps surveyed as early as 1915. These features are evidence of the long-term nature of pasture improvement and usage in the area.

ARCHEOLOGICAL BACKGROUND

The project area is within the Southeast Texas Archeological Region, which has been recently summarized by Patterson (1995). Other recent prehistoric summaries equally pertinent to the prehistory of the Brazoria-Fort Bend County area include Ensor (1991), Fields (1983, 1986), and Moore and Moore (1991). The reader is referred to these works for detailed data on the prehistory of this region.

Previous investigations in Southeast Texas have demonstrated that prehistoric people occupied this area as early as 12,000 years ago. All through prehistory the inhabitants were nomadic hunter-gatherers. Ensor (1990) has proposed a prehistoric cultural sequence of periods for Southeast Texas which are as follows: Paleo-Indian (10,000-8,000 BC), Early Archaic (8,000-5,000 BC), Middle Archaic (5,000-1,000 BC), Late Archaic (1,000 BC – AD 400), Early Ceramic (AD 400-AD 800), and Late Ceramic (AD 800-AD 1750).

Evidence for prehistoric occupation of Southeast Texas is scarce in the Paleo-Indian period, and indeed, is rather ambiguous through the Middle Archaic period (Patterson 1983; Aten 1983:156-157). However, although most previously recorded sites date to the Late Archaic and Ceramic periods, it is probable that earlier dating sites have been lost to erosion, channel cutting, and, particularly in the case of very early sites, to rising sea level. In cases where early-dating artifacts have been found, such as Wheat's (1953) finds of projectile points dating from the Paleo-Indian through Middle Archaic periods at Addicks Reservoir in western Harris County, the materials occur in deposits with poor contextual integrity.

Sites dating from the Late Archaic through the Ceramic periods are much more commonly found in the project vicinity. During the late Archaic period, modern climatic conditions evolved, sea level rose and stabilized, and coastal woodlands expanded. Aten (1983) hypothesizes that an increase in population and the establishment of seasonal rounds, including regular movement from littoral to inland areas occurred during the Late Archaic period. Particularly relevant to the prehistory of the project area are Hall's (1981) data from the Allens Creek project in nearby Austin County, Texas. Excavations of a large cemetery there suggest a Late Archaic trade system that linked Southeast Texas to Central Texas and areas eastward into Arkansas. The excavation of other, smaller cemeteries in this section of the Brazos River drainage, including some in Fort Bend County, have yielded similar evidence.

Aten (1983) has proposed that ceramics were introduced in the aboriginal artifact assemblage on the Upper Texas Coast at AD 100. Ensor places the beginnings of the Early Ceramic period at AD 400, which may be more applicable for areas inland from the coastline. The Early Ceramic period is characterized by a continued growth in population levels. Ensor (1991) places the beginning of the Late Ceramic at AD 800, which coincides with the introduction of the bow and arrow. A plain sand-tempered pottery dominates throughout both parts of the Ceramic era. Story (1990) has defined the Mossy Grove Cultural Tradition for Late Prehistoric cultures in Southeast Texas with sandy paste pottery being the principle diagnostic artifact type.

European settlement did not begin to seriously disrupt aboriginal habitation in the areas inland from the Upper Texas Coast until after AD 1700 (Patterson 1995; 249). European

diseases, probably introduced by explorers and early traders, did begin to have impacts as early as AD 1528. At least 7 epidemics were recorded among the tribes of the study area between that date and AD 1890 (Ewers, 1974). The project area appears to have been on the boundary of the territories of several Native American groups in the eighteenth and nineteenth centuries. Groups that may have resided in Harris County include the Atakapan, Karankawa, and the Tonkawa. During the eighteenth and nineteenth centuries, epidemic diseases, the mission system, and the fur trade acted to severely reduce, and in some cases exterminate, the indigenous populations.

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS

The current study area has been in the process of urbanizing for the last 50 years. A local resident[1] can remember when it was possible to ride across this entire area by horse without crossing a single fence. That time is gone and the landscape is now crisscrossed by railroads, pipelines, roads, and high-tension lines. Urban sub-divisions and industrial sites now occupy formerly open areas. Since the 1970's there been at least 13 archeological investigations performed within or close to the Preferred and Alternative Alignments of the current Project Area (Dureka 1998) (Figure 4). There have been an additional 93 within the four USGS quadrant maps that include the Project Area (Pasadena, La Porte, Friendswood, and League City).

There have been four road surveys that impact the Project Area. There have been two involving right-of-way (ROW) expansion on State Highway 225 (State Department of Highways and Public Transportation 1975 & 1986) and one for the original ROW survey for the construction of Beltway 8 (State Department of Highways and Public Transportation 1985). Additionally there was a survey for the initial ROW of Clear Lake City Boulevard (Hudson & Hudson 1989). None of these surveys encountered any historic or prehistoric materials.

Another six surveys have been performed for various water control and water treatment projects. These have ranged from flood control detention basins to intake sites for water purification plants. The survey of the Willowspring Creek detention facility (Moore & Moore 1993) found two historic sites, but both were determined to be 0f 20th century origin and therefore not significant. A survey by the Texas A&M Research Foundation (Baxter & Ippolito 1976) for the US Corp of Engineers on Vince and Little Vince Bayous just northwest of the current Project Area investigated the impacts of continued channeling of these streams. They found two essentially known sites within the impact area, one (41HR308) already marked by a Texas Historical Commission historic marker, and the other a modern cemetery (ca. 1900 to present) (Ibid.). Both sites are well outside the current Project Area. No other water work project has found archeological sites within the current study area.

One survey for the US Corp of Engineers covered a single crossing of a transmission line across Armand Bayou (Rochen 1990). This project covered a relatively small area and found no archeological remains. Another project for the city of La Porte investigated the proposed location for a sanitary landfill (Lee 1985). This project found an extensively disturbed historic house site (20th century). The site was determined too damaged to be considered significant and no further investigation was recommended before construction of the landfill facility began.

The Department of Anthropology at Rice University and the Houston Archeological Society in 1970 & 1971 (Hole ed. 1974) performed a survey of 30,000 acres along Armand Bayou. This survey was undertaken with the apparent purpose of assessing the area before urban development (then beginning to impact previously rural areas of southeastern Harris County) could encroach into the Armand Bayou watershed. It also had the added bonus of providing a training ground for members of the local archeological society (HAS).

[1] Mr. Ben F. Brannon's family first moved to the area in 1932 when he was a boy. He has lived in the area ever since.

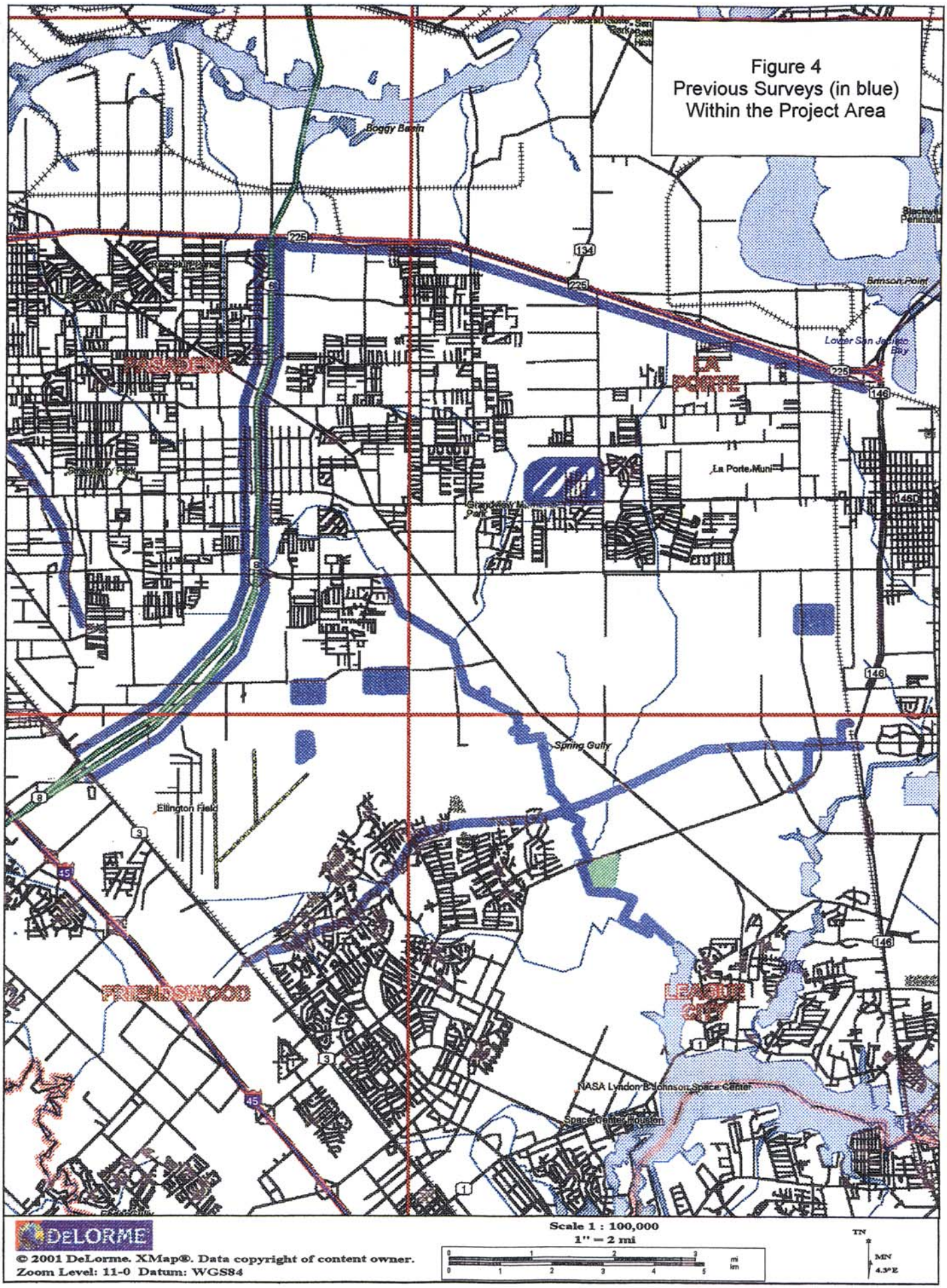
Figure 4
Previous Surveys (in blue)
Within the Project Area
Boggy Basin
Brinson Point
Lower San Jacinto Bay
Pasadena
La Porte
La Porte Muni
Spring Gully
Ellington Field
Friendswood
Clear Lake City
NASA Lyndon B Johnson Space Center
Space Center Houston
DeLORME
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Zoom Level: 11-0 Datum: WGS84
Scale 1 : 100,000
1" = 2 mi
TN
MN
4.3°E

A total of 14 sites in Harris County and one site in Galveston County were discovered during this two-year investigation of Armand Bayou. Five of these sites, all prehistoric, fall within one kilometer of the current Project Area. Four are reported to have been partially or entirely destroyed by dredging of the channel or other construction. All the destroyed or damaged sites consisted of a very small number of artifacts and likely represented only the most transitory of occupations. Only one of these sites included shell remnants (Ibid.).

Site, 41HR146, found by the Armand Bayou survey where this channel crosses the current Project Area, was still fully intact in 1970. The archeologists investigating the site at this time recovered 104 sherds, eight chert flakes, three pieces of ochre, and one dart point. According to O'Brien;

> "104 sherds were recovered, 74 from the 5-15 cm. Level and the remainder from the initial test pits. Every piece is extremely friable. No significant reconstruction could be done although all the pieces appear to have come from one vessel." (Hole ed. 1974, Pg. 34)

The archeologist determined 41HR146 to have been a transitory camp, possibly used only briefly by an individual or a small family sized group. This was based on the scarcity of artifacts.[2] O'Brien also conjectured that the lack of shell in the artifact assembly might be due to the sight being just beyond the range of shellfish distribution (Ibid.).[3]

None of the other nine sites discovered during these previous investigations fall within the current Project Area.

[2] Although most archeologists would not look upon 104 potsherds as a thin scatter of artifacts, O'Brien believed this assemblage represented fragments of a single artifact. This opinion is valid if indeed it can be shown that the sherds do not represent more than one vessel.

[3] Although the author could find no study to confirm this supposition it is not an unlikely one. 41HR146 is more than 10 kilometers upstream from Clear Lake and salinity levels, crucial for many estuarine shellfish, may not be high enough to maintain a population. In contrast however there are two destroyed sites which were found immediately across Armand Bayou from 41HR146. Although these sites had already been partially destroyed, the archeologists were able to find some examples of Rangia cuneata shells from the remnant surface. Additionally, this same survey found two small Rangia midden sites barely more than 2 kilometers down Armand Bayou.

METHODS

The survey plan for the Preferred Alignment (Alignment 1) was for the field crew to excavate a shovel test every 100 meters. These were placed within or immediately adjacent to the alignment corridor. Additional shovel tests (three on each side) were placed on each accessible bank at any stream crossings. Wherever needed, the shovel test interval was modified to facilitate sampling features of particular interest, such as "pimple" or "mima" mounds.[4] Modifications to the interval were also made to avoid features such as man-made drainage ditches, and parking lots. All visible surfaces along the planned alignments were examined for historic or prehistoric archeological materials. Surface visibility varied throughout the project area, from almost 100% in some exposed and eroded areas, to 0% in many of the overgrown fields, creek banks, and pastures.

Locations that were clearly disturbed by previous construction or landscaping activities, or where testing was impossible, were not shovel tested. This included industrial parks, parking lots, ditches, house pads, roads, pipelines, landscaped lawns, and berms. In some of the highly industrialized areas where the disturbance was particularly clear and covered long stretches of the alignments, shovel test interval might be greater than 1 kilometer. In one location the interval was nearly 1.5 kilometers.

The revised methodology planned for the 10 Alternative Alignments was based on three basic elements.

1st - All segments of the proposed corridors which were determined "disturbed" would be excluded from any further investigations. This involved the removal of large sections of some alignments, including the entirety of "1B" and "2D".

2nd - Survey within 300 meters of stream channels would continue to follow the survey methodology utilized for the Preferred Alignment. This included shovel testing every 100 meters, and additional shovel testing (a minimum of 6) at stream crossings.

3rd - The remainder of accessible and undisturbed segments of the Alternative Alignments would be walked and visually examined for any historic or prehistoric properties visible on the surface. Additionally, shovel testing would be performed on a random sampling of any pimple mounds, microknolls, or other raised features within the alignment corridors.

Altogether the revised methodology removed nearly 50% of the length of the Alternative Alignments from consideration in this investigation.

The crew excavated all shovel tests in 10-cm arbitrary levels and screened the soils through 1/4" hardware cloth. Soils that were too compact or clayey to sieve through hardware cloth were broken up by hand. All soil matrixes were carefully examined for cultural artifacts.

[4] Pimple mounds (also known as "mima' or "prairie" mounds) are described as elliptical hillocks ~6 to ~45 meters ~20 to ~150 feet) in diameter and up to 1.2 meters (~4 feet) in height (Aronow, 1995). Personal experience and Roger Moore's model of (1995) shows these to be common locations of prehistoric sites, especially in proximity to water sources.

Location, size, depth, and all other information for each shovel test was recorded on standardized Moore Archeological Consulting shovel test forms. Shovel tests were immediately backfilled. The UTM location of most shovel tests was recorded utilizing a Magellan Trailblazer GPS unit. The location of each shovel test was then plotted on a USGS quadrangle map of the project area.

Photographs were taken of major stream crossings. Photographs were also taken of features that stood out (i.e. pimple mounds, structures, etc…). Photograph direction, subject, photographer name, and dates were recorded on a standard Moore Archeological Consulting photo log.

RESULTS AND CONCLUSIONS

Preferred Alignment

Between December 18, 2001 and January 29, 2002 a crew from Moore Archeological Consulting performed a pedestrian archeological survey of the Preferred Alignment (Alignment 1) for proposed Bayport Rail Loop. As mentioned in the methodology section, this survey was performed utilizing a combination of controlled shovel testing every 100 meters, the sampling of particular features (both banks of creek crossings and "pimple" mounds), and visual survey of all visible surfaces with right-of-entry. This sampling methodology resulted in the excavation of 169 shovel tests and the visual inspection of approximately 20.36 kilometers of ground surface over the length of the Preferred Alignment.

Of the 169 shovel tests excavated on Alignment 1 (Figure 5), 51 were excavated in disturbed soils. This number does not accurately assess the total disturbance of this alignment as many clearly disturbed areas were shovel tested at a greatly increased interval (sometimes as much as 1.5 kilometers between tests). A large percentage of these disturbances took the form of large-scale industrial sites (such as chemical and petroleum processing plants and construction material stockpiles), and urbanized areas. Most of the other disturbances were the result of fill or churning from various construction episodes (roads, straightening of streams, pipeline and other right of ways).

Out of the 169 shovel tests excavated on Alignment 1, 151 (or approximately 91%) were 50 centimeters below surface (cmbs) or less. The bulk of these were within the 30-40 cmbs range.[5] Most shovel tests were excavated in soils where clay was evident at, or immediately below, the surface. No more than 18 shovel tests were deeper than 50 cmbs and none exceeded 65 cmbs. This was the result of encountering dense basal or Pleistocene clays, usually 20 or more centimeters above the final depth.

Only one historic site was found on Alignment 1 for 169 shovel tests. The historic site was determined to be the previously recorded 41HR321[6] and no further excavations were performed or recommended. No prehistoric sites were found during the survey. One location, near a side drainage of Armand Bayou, yielded a few heavily eroded pieces of burned clay. These were initially identified as pottery sherds, but additional analysis in the lab changed this identification.

[5] This is generally considered deep enough to confirm that the shovel test has encountered deep basal or Pleistocene clay within the soil types present within the Project Area.

[6] Richard Gregg originally recorded this site as a 20th century homestead in 1977. He believed the foundation and chimney to have been displaced after the home was abandoned and recorded it as being destroyed. Gregg declared the site to not be eligible for either the National Register of Historic Places or as a Archeological Landmark.

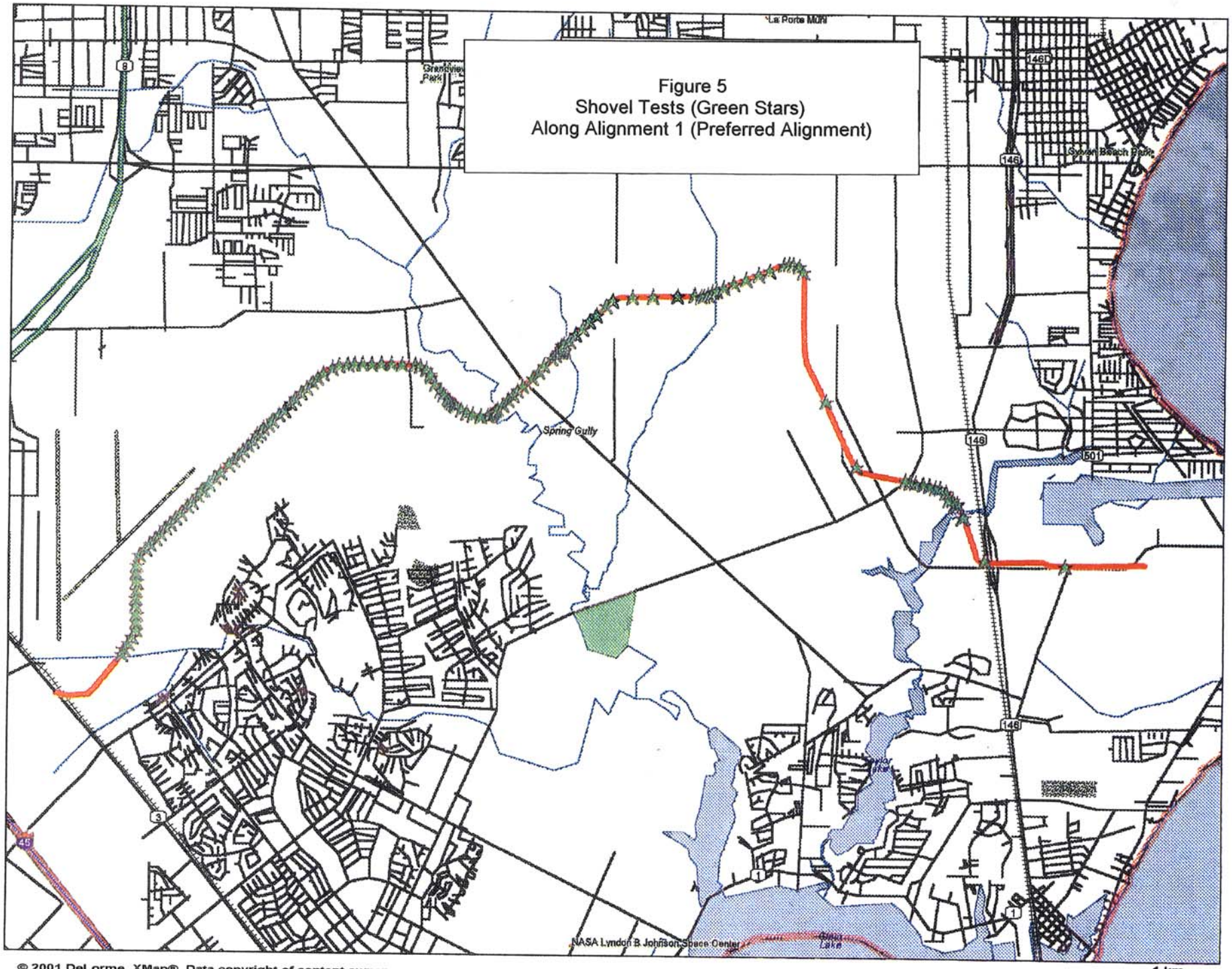

Figure 5
Shovel Tests (Green Stars)
Along Alignment 1 (Preferred Alignment)

Scale: 1 : 68,750 Zoom Level: 11-5 Datum: NAD27 Map Rotation: 0° Magnetic Declination: 4.3°E

Alternative Alignments

There were 10 alternative alignments for the proposed project totaling approximately 47.7 kilometers in distance. All lettered alternative alignments are modifications of their primary numbered routes (i.e. alignment 1A is a modification of alignment 1). As such, the original description of the lettered alternatives provided by the client included the unmodified portions of the base alignment.[7] For the purpose of this investigation, the new aspects of these modified routes were dealt with as distinct and separate from their primary alignment.

There were 14 shovel tests excavated in the survey of the alternative alignments. The results of the fieldwork on each Alternative Alignment are as follows.

Alignment 1A

Alternative Alignment 1A is a 5.2-kilometer modification that splits from Alignment 1 at the eastern edge of Ellington Field. It rejoins the Preferred Alignment approximately 2 kilometers west of Big Island Slough (Figure 6). Alternative Alignment 1A was removed from consideration by the client before fieldwork commenced. As a result no further work was performed on this alternative.

Alignment 1B

Alternative Alignment 1B is a 2.44-kilometer modification of Alignment 1. It departs from Alignment 1 just south of Choate Road and follows an existing siding as it crosses a bridge over Taylor Bayou. It rejoins the preferred alignment just before it crosses State Highway 146 (Figure 7).

Initial reconnaissance, including shovel probing, determined that this route was 100% disturbed. This disturbance was caused by the construction from an existing rail siding and of high-tension towers along the alignment. Under the adjusted survey strategy it was determined that there was no need for any shovel tests to be excavated here. Examination of the visible surfaces of this alignment revealed no sites.

Alignment 1C

This alignment is a 3.66-kilometer modified route running primarily southwest to northeast. It departs from the preferred alignment just south of Ellington Field and generally parallels it. Alignment 1C then rejoins the preferred alignment along the eastern edge of Ellington Field near the Boeing and NASA facilities on Space Center Boulevard (Figure 8). Preliminary reconnaissance and examination of aerial photographs and other data showed that approximately 80% of this alignment is already disturbed. Based on this assessment and the adjusted survey strategy no shovel testing was planned in these areas.

[7] The description of Alignment 1A included all unmodified segments of Alignment 1 as well as the modifications.

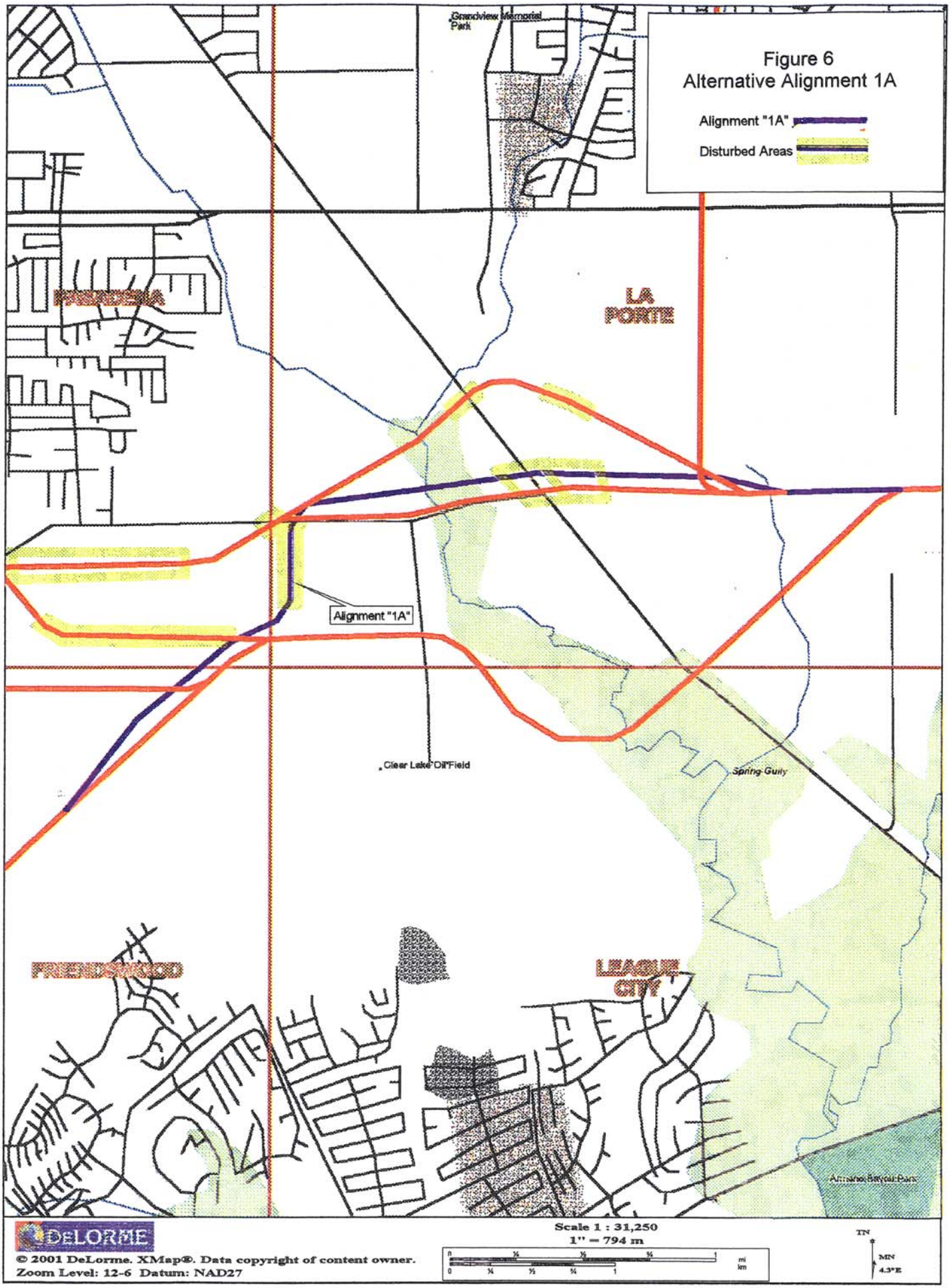
Figure 6
Alternative Alignment 1A
Alignment "1A"
Disturbed Areas
Grandview Memorial Park
PASADENA
LA PORTE
Alignment "1A"
Clear Lake Oil Field
Spring Gully
FRIENDSWOOD
LEAGUE CITY
Armand Bayou Park
DeLORME
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Zoom Level: 12-6 Datum: NAD27
Scale 1 : 31,250
1" = 794 m
mi
km
TN
MN
4.3°E

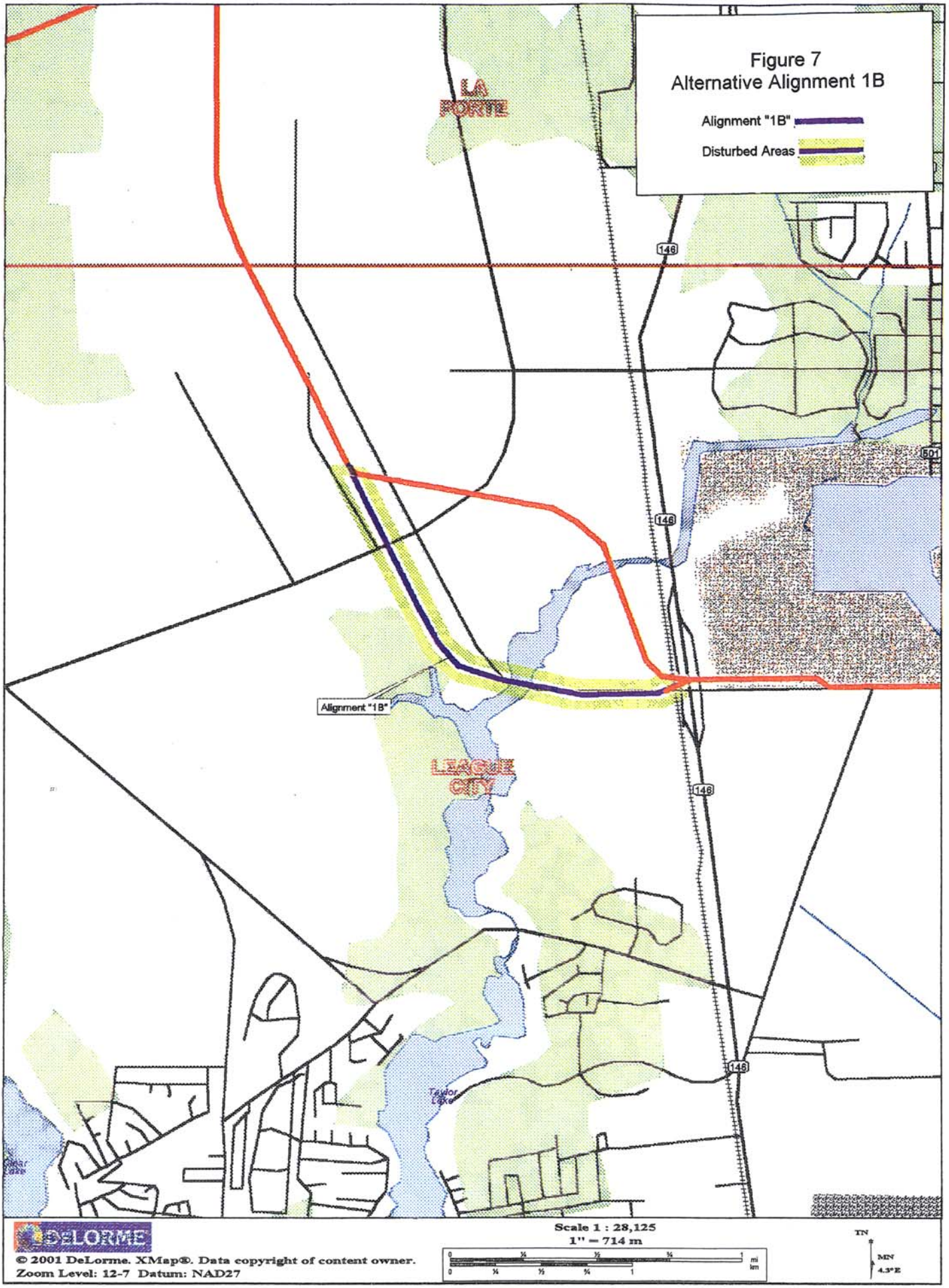
Figure 7
Alternative Alignment 1B
Alignment "1B"
Disturbed Areas
LA PORTE
146
501
Alignment "1B"
LEAGUE CITY
Taylor Lake
DELORME
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Zoom Level: 12-7 Datum: NAD27
Scale 1 : 28,125
1" = 714 m
TN
MN
4.3°E

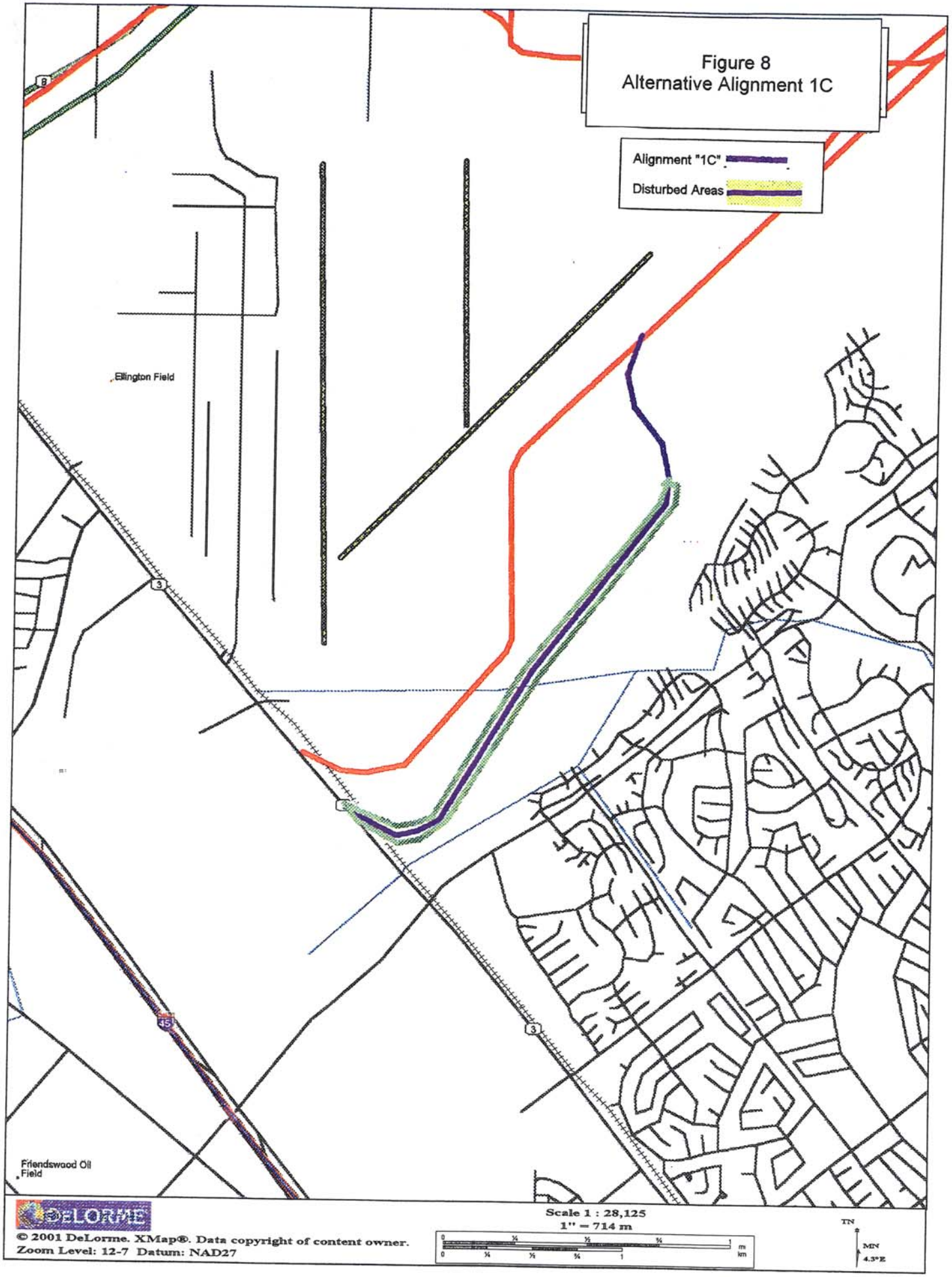
Figure 8
Alternative Alignment 1C
Alignment "1C"
Disturbed Areas
Ellington Field
Friendswood Oil Field
8
3
45
DeLORME
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Zoom Level: 12-7 Datum: NAD27
Scale 1 : 28,125
1" = 714 m
TN
MN
4.3°E

Before fieldwork began it was determined that obtaining right of entry to the properties along this route was unlikely. Determination of clearance of the undisturbed 20% can only be implied. This was done by a detailed examination of higher definition aerial photographs provided by the client and also by looking at the route where it approaches publicly accessible areas. These close approaches include where the alignment departs from Highway 3, where it runs along the western edge of Sylvan Rodriguez Park, and where the route approaches Space Center Boulevard. Observations made from these areas allowed views of virtually the entire alignment. None of the examinations made found any remnants of historic properties within the alignment.

Alignment 1C is the only alternative not removed from consideration by the client that retains a crossing of an extant stream. This is Horsepen Bayou. It is evident from the aerial photographs and from visual observation from publicly accessible points that this crossing is one of the most disturbed points in the alignment. The stream itself has been straightened since the original survey for the Genoa (now Friendswood) in 1916. Additionally, the crossing is located at the confluence of another man-made drainage ditch flowing from the edges of Ellington Field into Horsepen Bayou. It is additionally impacted by what appears to be a small water treatment plant and multiple pipelines. It is unlikely that any archeological deposits have survived these impacts.

Alignment 2

Alignment 2 is 9.76 kilometers long. It runs off an existing GH&H line from the intersection of the Sam Houston Parkway and Old Galveston Road (State Highway 3) along the Parkway. It then bends off to the east following or paralleling Genoa-Red Bluff Road until merging with Alignment 1 just south of the Bayport Rail Terminal (Figure 9). Preliminary reconnaissance and examination of aerial photographs and other data showed that approximately 75% of this alignment was already disturbed.

The bulk of Alignment 2, east of where the sub-routes 2A-D break away from it, was removed from consideration by the client before fieldwork commenced. As a result no further work was performed on this portion of the alignment. The trunk line of Alignment 2 remained in consideration as a part of Alignments 2B, 2C, and 2D. Surface examination of the trunk line of Alignment 2 was performed and revealed no sites.

Alignment 2A

This alignment is a modification that breaks away from Alignment 2 approximately one kilometer west of where it crosses Armand Bayou. It proceeds to the northeast until shortly after it crosses Red Bluff Road. It then changes to east-southeast merging with Alignment 1 just south of the Bayport Rail Terminal (Figure 10).

Alternative Alignment 2A was removed from consideration by the client before fieldwork commenced. As a result no further work was performed on this alternative. This removed one of the crossings of Armand Bayou.

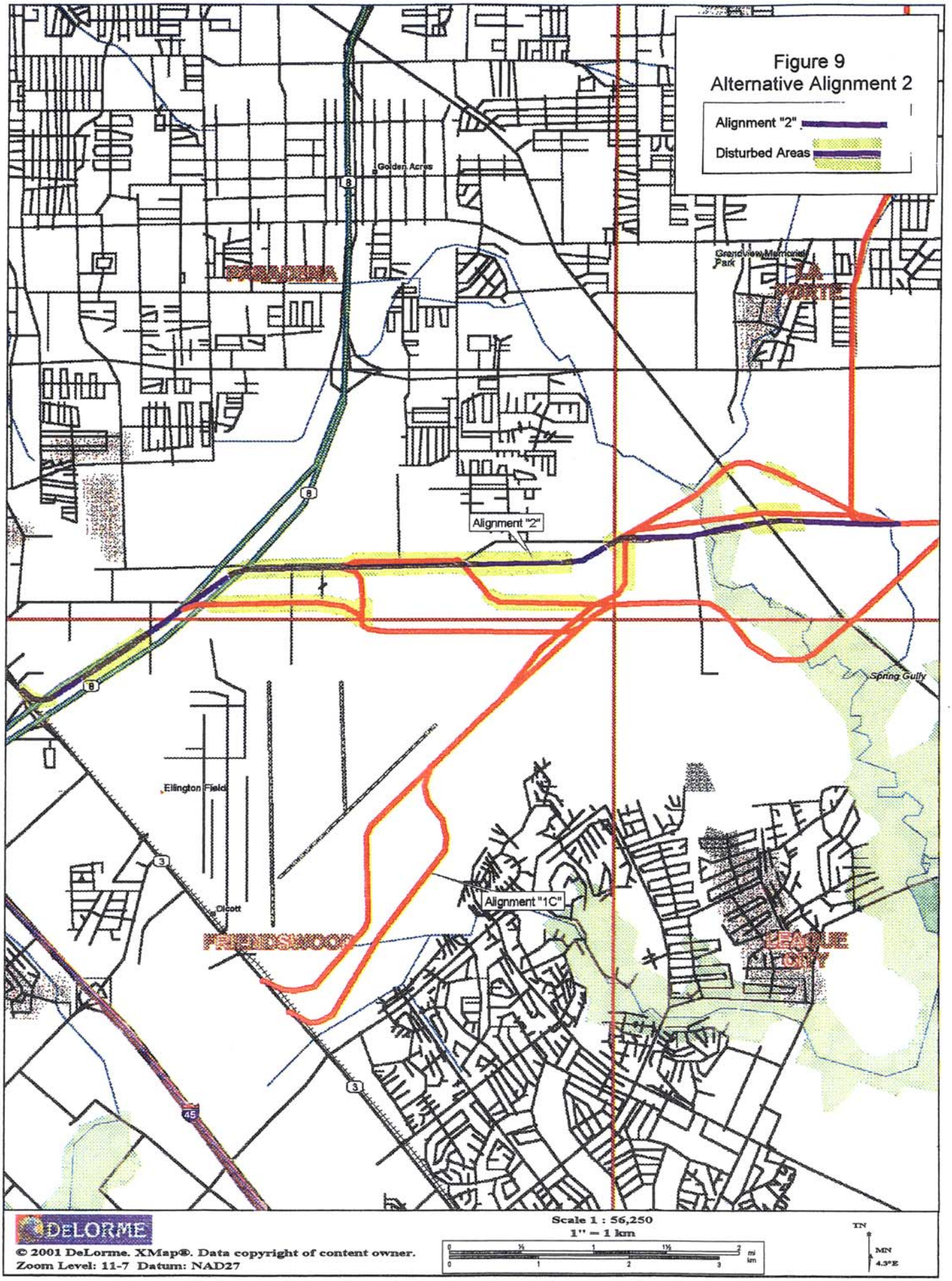
Figure 9
Alternative Alignment 2
Alignment "2"
Disturbed Areas
Golden Acres
Grandview Memorial Park
LA PORTE
Alignment "2"
Spring Gully
Ellington Field
Alignment "1C"
FRIENDSWOOD
LEAGUE CITY
DeLORME
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Zoom Level: 11-7 Datum: NAD27
Scale 1 : 56,250
1" = 1 km
TN
MN
4.3°E

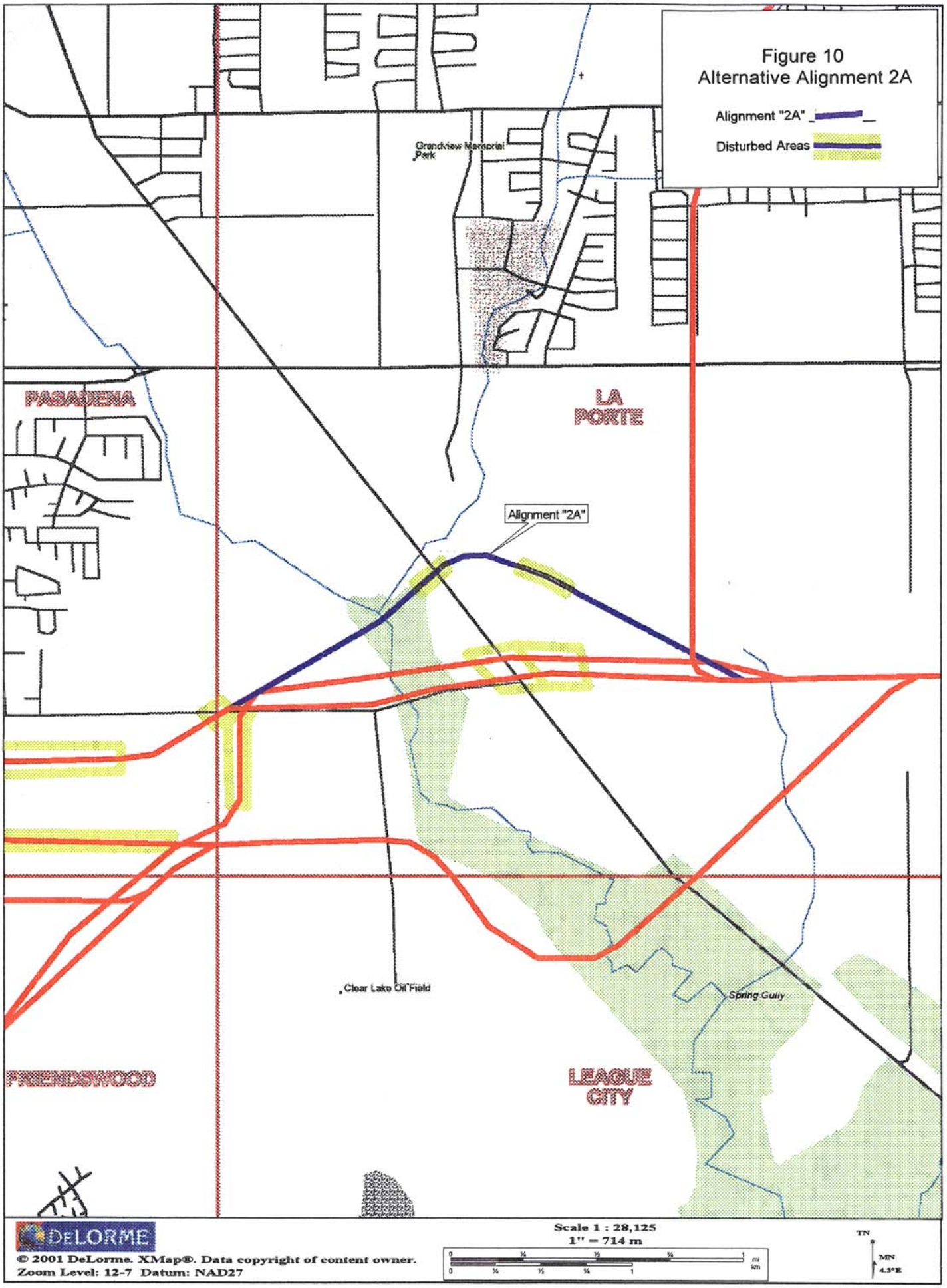
Figure 10
Alternative Alignment 2A
Alignment "2A"
Disturbed Areas
Grandview Memorial Park
PASADENA
LA PORTE
Alignment "2A"
Clear Lake Oil Field
Spring Gully
FRIENDSWOOD
LEAGUE CITY
DELORME
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Zoom Level: 12-7 Datum: NAD27
Scale 1 : 28,125
1" = 714 m
TN
MN
4.3°E

Alignment 2B

Alignment 2B begins where it breaks off from Alignment 2 just west of the City of Houston Southeast Water Treatment Facility. It runs along the west and south property boundaries of this facility before running due east merges with Alignment 1 approximately 1.5 kilometers northeast of the eastern edge of Ellington Field (Figure 11). Approximately 50% of this alignment was determined to be disturbed and was only walked for confirmation.

Access to the segment of this alignment where it crossed the City of Houston Southeast Water Treatment Facility was not obtainable from the City of Houston. As a result this approximately half-kilometer portion was not surveyed. It is the opinion of the author[8] that this segment has been highly disturbed by construction and clearing activity associated with the water treatment facility grounds. It is felt that there is no need for additional survey of this property should this alignment be chosen.

Surface examination in the portions of Alignment 2B between the water treatment facility and where it joins Alignment 1 found the area to be scattered with pimple mounds. A small number of these features (six) were sampled by shovel testing with negative results (Figure 14). Although pimple mounds are often foci for archeological sites, such finds are most commonly associated with a relatively close proximity to water. The nearest natural water to Alignment 2B is a side tributary to Armand Bayou. This drainage is more than 300 meters from the easternmost end of the alignment.

No sites were found during the surface examination and shovel testing along this alignment.

Alignment 2C

This modified alignment leaves Alignment 2 at approximately the same area where 2B separates from it. It then briefly parallels the north side of Genoa-Red Bluff Road before it veers to the southeast immediately after passing the City of Houston Southeast Water Treatment Water Treatment Facility. After it crosses the segment of Space Center Boulevard currently under construction it swings east. It follows this path paralleling a large drainage ditch until it merges with Alignment 1 (Figure 12). Approximately 35% of this route was determined to be disturbed and was walked for confirmation.

Surface examination in the portions of Alignment 2C between the water treatment facility and where it joins Alignment 1 found the area to be scattered with pimple mounds. A small number of these features (eight) were sampled by shovel testing with negative results (Figure 14). Although pimple mounds are often foci for archeological sites, such finds are most commonly associated with a relatively close proximity to water.

[8] This opinion is based on examination of aerial photographs, soils maps, and a visual inspection from outside the plant's perimeter.

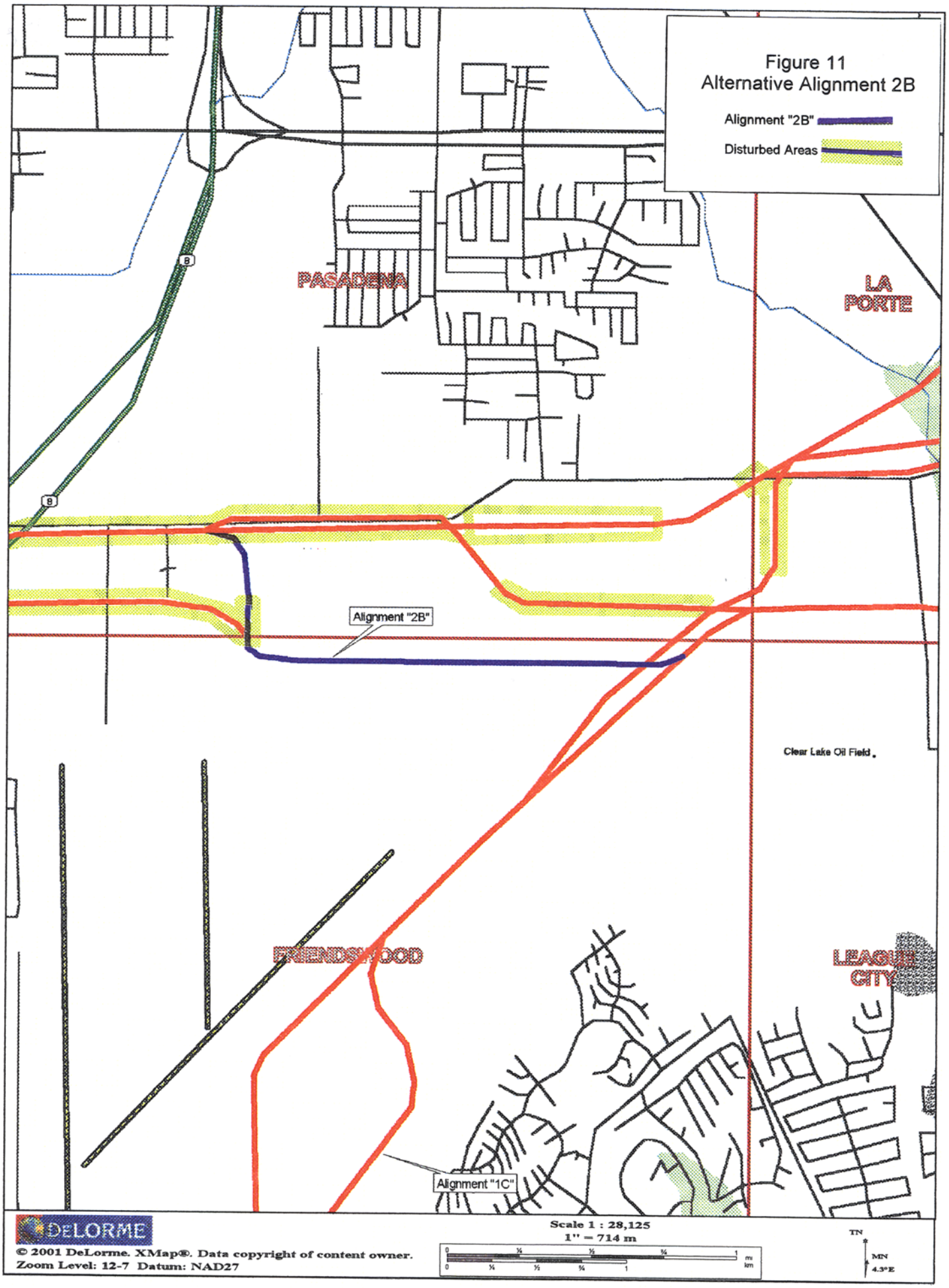
Figure 11
Alternative Alignment 2B
Alignment "2B"
Disturbed Areas
PASADENA
LA PORTE
Alignment "2B"
Clear Lake Oil Field
FRIENDSWOOD
LEAGUE CITY
Alignment "1C"
DeLORME
© 2001 DeLorme. XMap®. Data copyright of content owner.
Zoom Level: 12-7 Datum: NAD27
Scale 1 : 28,125
1" = 714 m
TN
MN
4.3°E

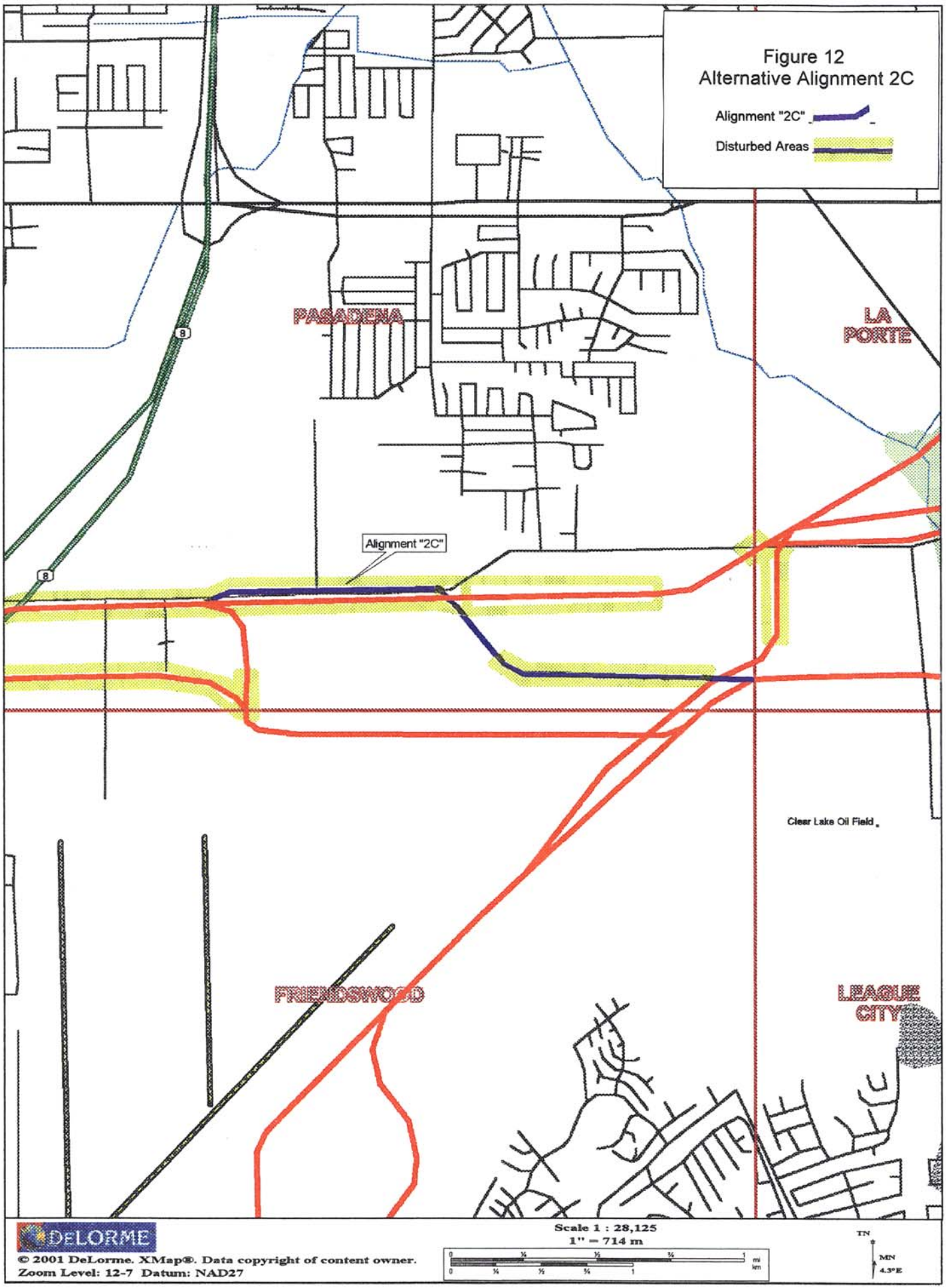
Figure 12
Alternative Alignment 2C
Alignment "2C"
Disturbed Areas
PASADENA
LA PORTE
Alignment "2C"
Clear Lake Oil Field
FRIENDSWOOD
LEAGUE CITY
DeLORME
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Zoom Level: 12-7 Datum: NAD27
Scale 1 : 28,125
1" = 714 m
TN
MN
4.3°E

The nearest natural water to Alignment 2C is a side tributary to Armand Bayou. This drainage is more than 300 meters from the easternmost end of the alignment.

No sites were found during the surface examination and shovel testing along this alignment.

Alignment 2D

Alignment 2D is a minor modification running between Alignment 2 and Alignment 2B (Figure 13). It covers a distance of approximately 2.13 kilometers. During the initial reconnaissance it was evident that this route is 100% disturbed by numerous construction events. This includes a large drainage ditch, excavated sand and gravel pits, and city block-sized piles of construction materials. Based on this assessment and the adjusted survey strategy no shovel testing or surface examination was performed on this alignment.

Alignment 3

This alignment is an 8.235-kilometer stretch running primarily south to north. It departs from the preferred alignment just west of the Equistar industrial site refinery and turns north. For much of its distance it parallels Canada Road and then Willow Spring (a heavily channeled stream) until it merges with State Highway 225 (Figure 15). Preliminary reconnaissance and examination of aerial photographs and other data showed that approximately 40% of this alignment is already disturbed. Based on this assessment and the adjusted survey strategy no shovel testing was planned in these areas. Where possible these areas would be walked and visible surfaces examined.

No natural streams are crossed by this alignment. It does cut across numerous small drainage and irrigation channels. The alignment also parallels Willow Creek for almost half of its length. This stream has long been channeled for drainage purposes and is disturbed.

Alternative Alignment 3 was removed from consideration by the client before fieldwork commenced. As a result no further work was performed on this alternative.

Alignment 4

This alignment is a 7.32-kilometer stretch running primarily south to north. It departs from the preferred alignment just north of the Basell refinery and parallels the existing siding until merging with it where it curves to parallel State Highway 225 (Figure 16). Preliminary reconnaissance and examination of aerial photographs and other data showed that approximately 45% of this alignment is already disturbed. Based on this assessment and the adjusted survey strategy no shovel testing was planned in these areas. Where possible these areas would be walked and visible surfaces examined.

No natural streams are crossed by this alignment. It does cut across numerous small drainage and irrigation channels. It also crosses what formerly were the upper reaches of

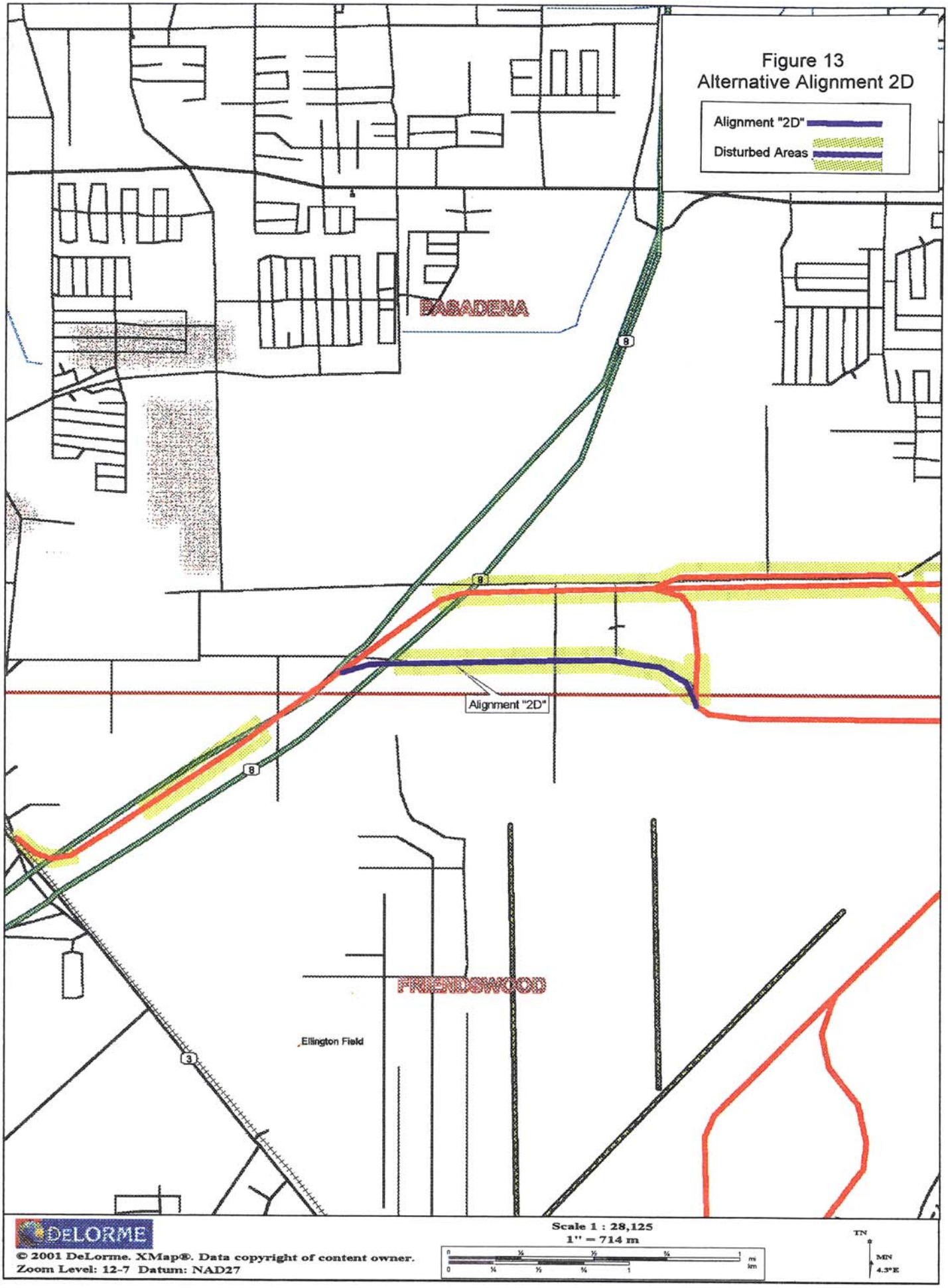
Figure 13
Alternative Alignment 2D
Alignment "2D"
Disturbed Areas
PASADENA
FRIENDSWOOD
Ellington Field
Alignment "2D"
8
3
DELORME
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Zoom Level: 12-7 Datum: NAD27
Scale 1 : 28,125
1" = 714 m
TN
MN
4.3°E

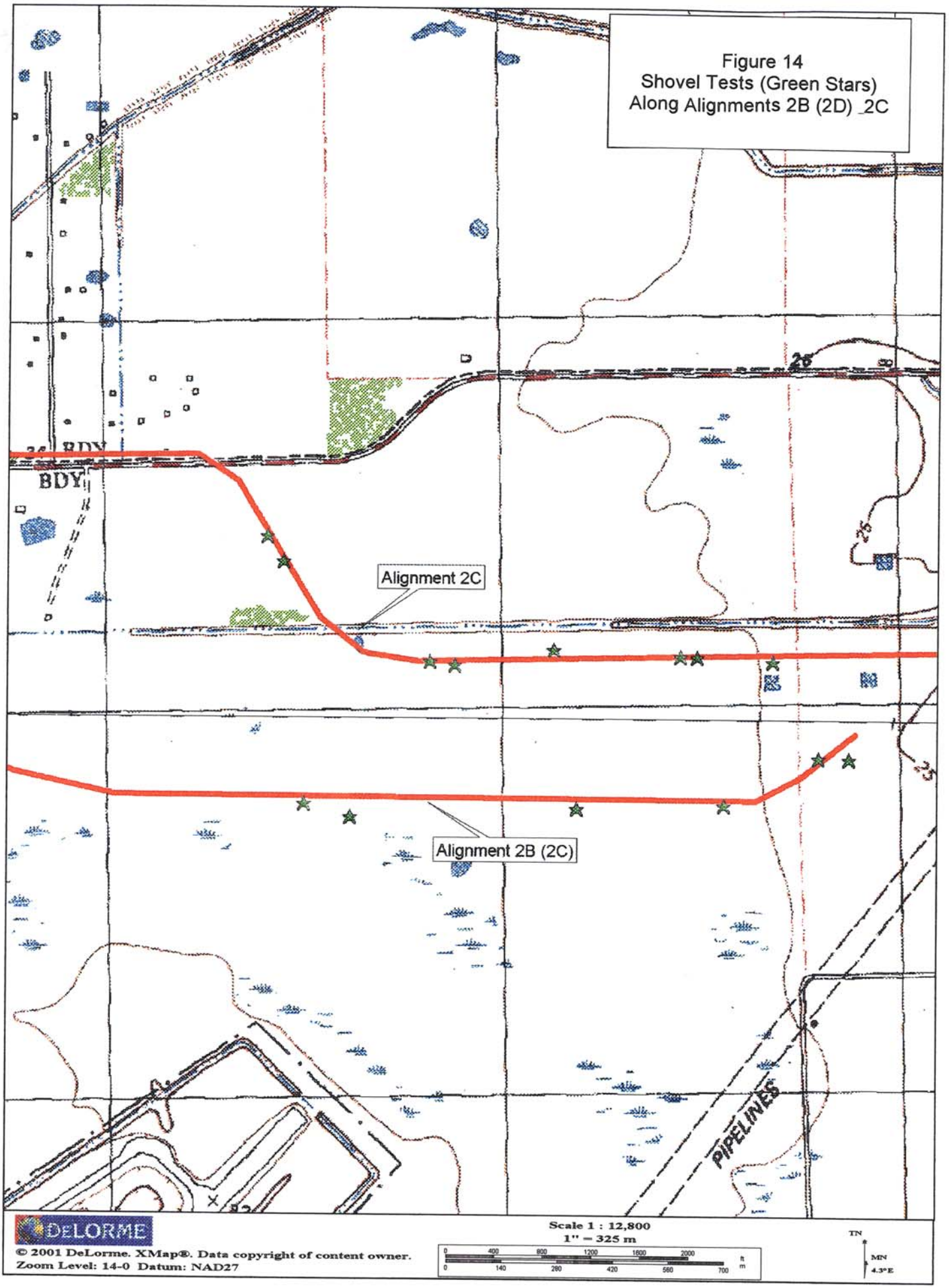
Figure 14
Shovel Tests (Green Stars)
Along Alignments 2B (2D) 2C
BDY
Alignment 2C
Alignment 2B (2C)
PIPELINES
DeLORME
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Zoom Level: 14-0 Datum: NAD27
Scale 1 : 12,800
1" = 325 m
TN
MN
4.3°E

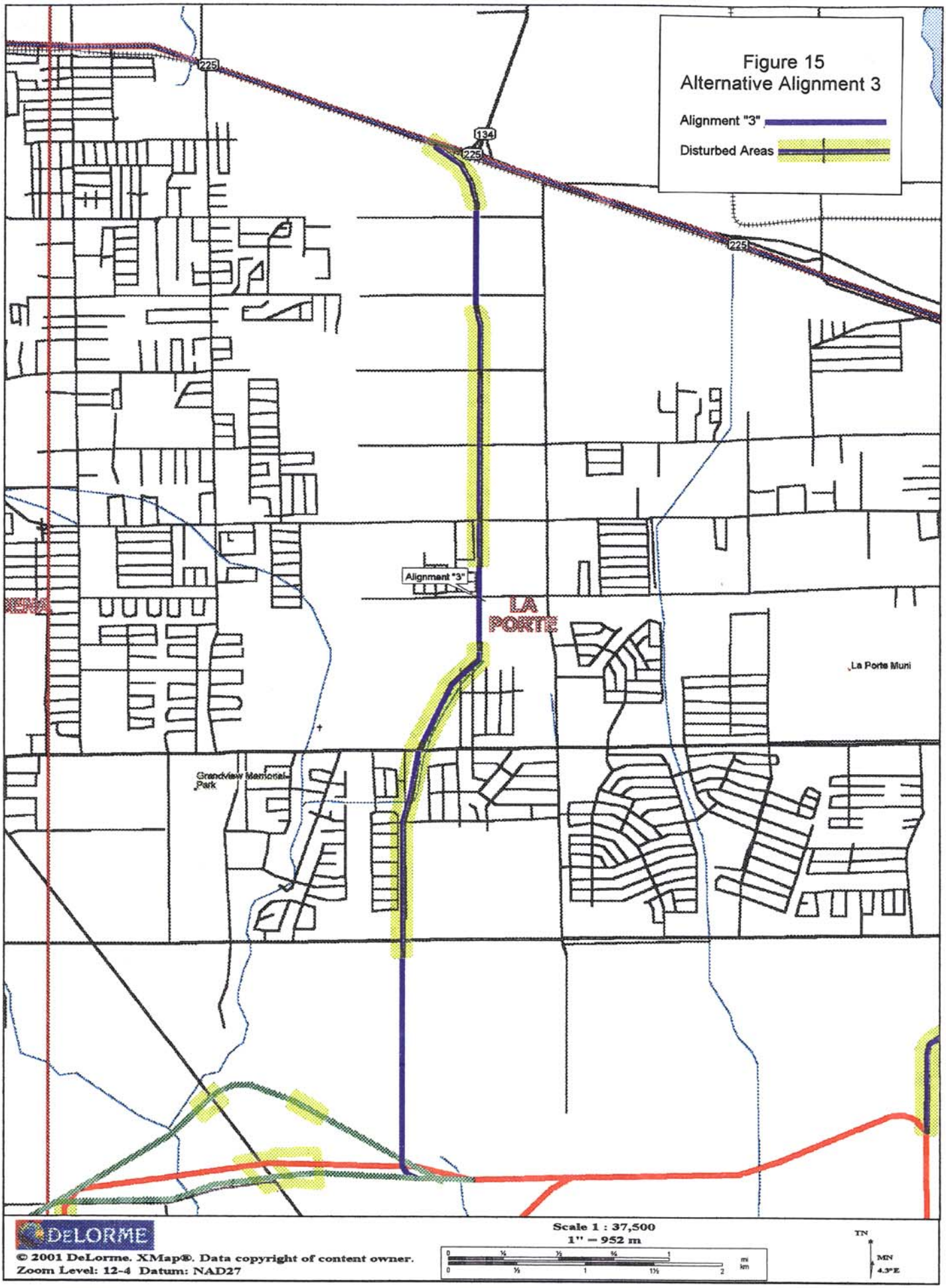
Figure 15
Alternative Alignment 3
Alignment "3"
Disturbed Areas
225
134
225
225
Alignment "3"
LA PORTE
La Porte Muni
Grandview Memorial Park
DeLORME
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Zoom Level: 12-4 Datum: NAD27
Scale 1 : 37,500
1" = 952 m
TN
MN
4.3°E

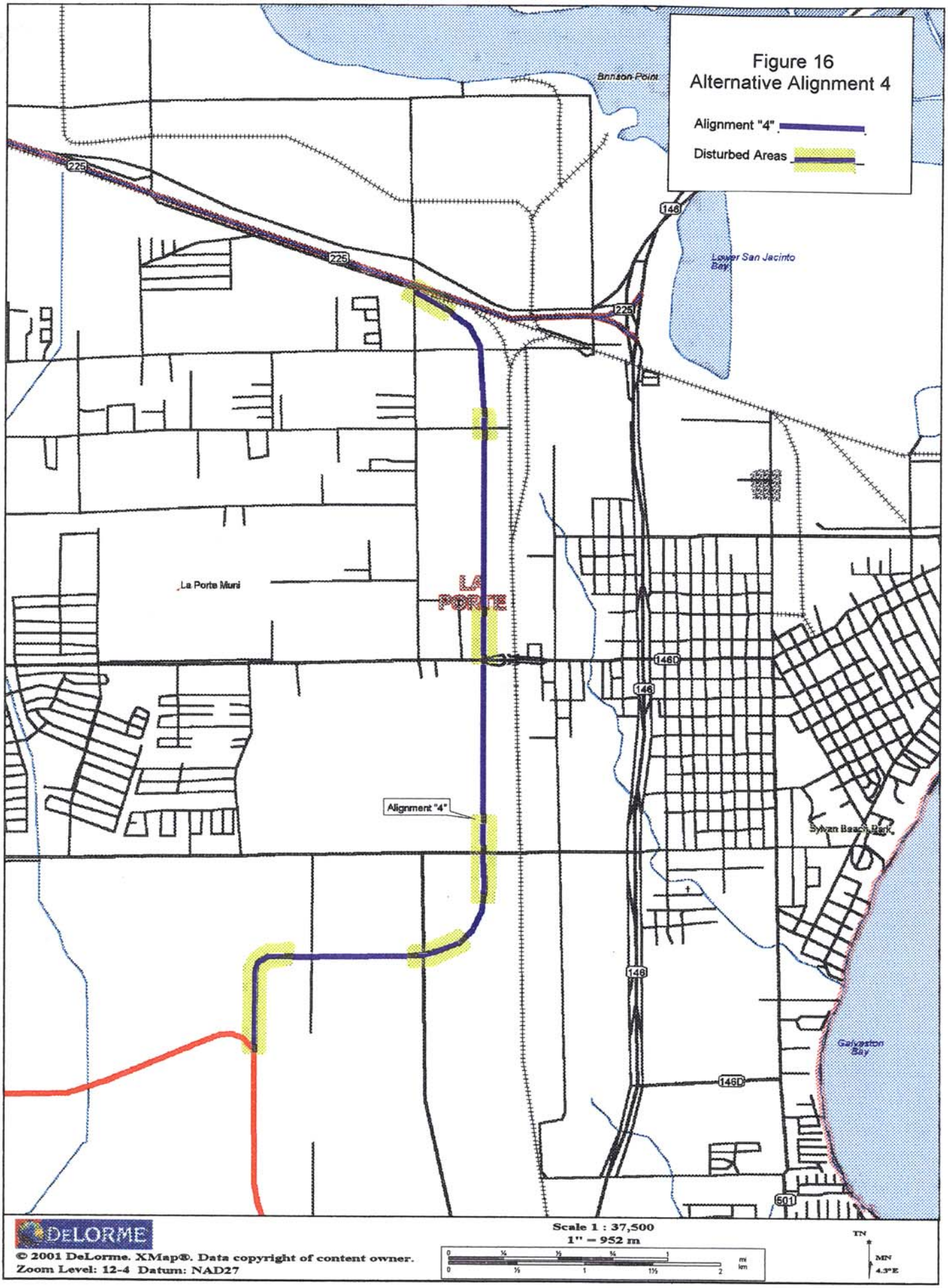
Figure 16
Alternative Alignment 4
Alignment "4"
Disturbed Areas
Brinson Point
Lower San Jacinto Bay
225
146
La Porte Muni
LA PORTE
146D
Alignment "4"
Sylvan Beach Park
Galveston Bay
501
DeLORME
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Zoom Level: 12-4 Datum: NAD27
Scale 1 : 37,500
1" = 952 m
TN
MN
4.3°E

Little Cedar Bayou. The channel for this stream shows up on the 1915 USGS quad map but is no longer visible on the latest edition of that quadrangle.

Alternative Alignment 4 was removed from consideration by the client before fieldwork commenced. As a result no further work was performed on this alternative.

RECOMMENDATIONS

No previously unrecorded cultural materials or deposits were encountered during the course of this investigation. Although some portions of Alignments 1C and 2B could not be surveyed due to right of entry issues, it is felt that sufficient alternative examinations were made of the areas bypassed to compensate this issue. It is therefore recommended that the proposed Bayport Rail Loop be permitted to proceed with no further cultural resource investigations. Should archeological deposits or features be encountered during construction, it is advised that construction cease in the immediate area of the finds and the Archeology Division of the Texas Historical Commission be contacted for further consultation.

REFERENCES CITED

Abbot, James T.
2001 *Houston Area Geoarcheology; A Framework for Archeological Investigation, Interpretation, and Cultural Resource Management in the Houston Highway District*. Texas Department of Transportation, Environmental Affairs Division, Archeological Studies Program, Report 27.

Aronow, Saul
1995 Geomorphology and Surface Geology of Harris County and Adjacent Parts of Brazoria, Fort Bend, Liberty, Montgomery, and Waller Counties, Texas. Appendix III to Roger Moore's *The Mossy Grove Model of Long Term Forager-Collector Adaptations in Inland Southeast Texas.* Ph.D. dissertation, Department of Anthropology, Rice University, Houston. University Microfilms International, Ann Arbor, MI

Aten, Lawrence E.
1983 *Indians of the Upper Texas Coast*. National Parks Service, United States Department of the Interior. Washington, D.C.

Baxter, Edward P. & John E. Ippolito
1976 *An Archeological Survey of the Vince and Little Vince Bayous, Harris County, Texas*. Anthropology Laboratory of Texas A & M, College Station, Texas. Report No. 23

Blair, Frank W.
1950 *The Biotic Provinces of Texas*. The Texas Journal of Science 2 (1):93-117

Carr, John T.
1967 *The Climate and Physiography of Texas*. Texas Water Development Board Report Number 53. Austin, Texas.

Dureka, J. Thomas
1998 *Cultural Resource Surveys of Harris County, Texas*. Volumes I-IV. Moore Archeological Consulting. Houston, Texas

2000 *Cultural Resource Gazetteer for the State Highway 36 Environmental Assessment, Volumes I, II, & III*. Moore Archeological Consulting. Houston, Texas

Ensor, H. Blaine
1991 *Comments on Prehistoric Chronology Building in Southeast Texas*. Houston Archeological Society Journal, 98:1-11

Ewers, John C.
1974 *The Influence of Epidemics on the Indian Populations and Cultures of Texas*. Plains Anthropologist, Volume 8: 104-115. Lincoln Nebraska

Gadus, Eloise F., and Margaret Ann Howard
1990 *Hunter-Fisher-Gatherers on the Upper Texas Coast: Archeological Investigations at the Peggy Lake Disposal Area, Harris County, Texas (Volume 1).* Prewitt and Associates, Inc., Report of Investigations Number 74. Austin

Hall, Grant D.
1981 *Allens Creek: A Study in the Cultural Prehistory of the Lower Brazos River Valley, Texas*. Texas Archeological Survey Research Report 61. Austin

Hoffman, G. O., B. J. Ragsdale and J. Daniel Rogers
n.d. *Know Your Grasses*. Texas Agricultural Extension Service. The Texas A & M University System. College Station, Texas.

Hole, Frank. editor
1974 *Archeological Investigations Along Armand Bayou, Harris County, Texas.* Technical Report Number Two. Department of Anthropology. Rice University. Houston, Texas.

Hudson, Jack C. & Kay G. Hudson
1989 *Archeological Reconnaissance Survey, Clear Lake City Boulevard (Proposed FM 2351).* Cultural Resource Services, Inc., Report of Investigations 88-2. Seabrook Texas.

Lee, Reed
1985 *Final Report Of A Cultural Resource Survey Of A Proposed Sanitary Landfill Site, La Porte, Harris County, Texas*. Lee Research Services. Dallas, Texas.

Moore, Roger
1995 *An Empirical Analysis of Elements of Prehistoric Site Location and Formation In Harris County, Texas*. Moore Archeological Consulting, Report of Investigations, Number 149

Moore, Roger G., and William E. Moore
1991 *A Cultural Resources Survey of the Proposed 750 Acre Joseph S. and Lucie H. Cullinan Park, Fort Bend County, Texas*. Moore Archeological Consulting, Report of Investigations Number 50.

1993 *An Archeological Survey of a 200 Acre Willowspring Creek Regional Detention Facility (HCFCD Unit B512-01-00) in Southeast Harris County, Texas.* Moore Archeological Consulting, Report of Investigations, Number 99

Patterson, Leland W.
1983 *Prehistoric Settlement and Technological Patterns in Southeastern Texas.* Bulletin of the Texas Archeological Society, Volume 54: 253-270.

1995 *The Archeology of Southeast Texas*. Bulletin of the Texas Archeological Society, 66: 239-264

Rochen, George R.
1990 Letter to Dr. James Bruseth, Deputy State Historic Preservation Officer, Texas Historical Commission, March 15, 1990. Copy on File Moore Archeological Consulting, Houston, Texas.

St. Clair, A. E., C. V. Proctor, W. L. Fisher, C. W. Kreitler, and J. H. McGowen
1975 *Land Resources Laboratory Map Series – Houston – Galveston Area Council* . The University of Texas, Bureau of Economic Geology. Austin.

State Department of Highways and Public Transportation
1975 *Cultural Resource Assessment, Harris County, SH225: From IH 10 to SH146.* Austin

1985 *Cultural Resources Assessment, Harris County, Beltway 8, Section II: From SH225 to IH 45 (South).* Austin

1986 *Cultural Resource Assessment, Harris County, SH225: From Beltway 8 to SH146 – 7.6 miles*. Austin

Tharp, B. C.
1939 *The Vegetation of Texas*. Texas Academy of Sciences, Non-Technical Series 1 (I-vi): 1-74

Wheat, Joe Ben
1953 *An Archeological Survey of the Addicks Dam Basin, Southeast Texas.* Bureau of American Ethnology Bulletin 154: 143-252. Washington, D.C.

Wheeler, Frankie F.
1976 *Soil Survey of Harris County, Texas*. United States Department of Agriculture, Soil Conservation Service and Forest Service, and Texas Agricultural Experiment Station.

APPENDIX A: SURVEY REVISION LETTER WITH TEXAS HISTORICAL COMMISSION CONCURRENCE

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March 4, 2002

Myles Miller
Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711-2276

Re: Bayport Loop Rail, Alternative Alignments, Surface Transportation Board Project
MAC PN 01-100

Dear Mr. Miller

This is an initial analysis of the survey of Alignment 1 and the reconnaissance of all alternative alignments for the proposed Bayport Loop Build-In in Houston, Texas (see Appendix for alternative routes). The purpose of this analysis is to reassess the methodology utilized during the survey of Alignment 1 and to recommend changes based on these results. It will also consider the results of the initial reconnaissance of the alternative alignments, examination of the soils described for the area, records of known archeological sites, and aerial photographs of the project area. It will also be assessed by comparison to Roger Moore's model (1995).

Survey of Alignment 1, the first proposed alignment, was performed by crews from Moore Archeological Consulting between December 18, 2001 and January 29, 2002. A total of 169 shovel tests were excavated. Of these, 51 (or approximately 30%) were excavated in disturbed soils. Even this number is not an accurate assessment of the total disturbance of this alignment as many clearly disturbed areas were shovel tested at a greatly increased interval (sometimes as much as 1000 meters between tests). These disturbances took the form of plow zones and fill or churning from various construction episodes (roads, straightening of streams, pipeline and other right of ways). It also included industrial parks.

Out of the 169 shovel tests excavated on Alignment 1, 154 (or approximately 91%) were 40 centimeters below surface (cmbs) or less. The bulk of these were within the 30-40 cmbs range[1]. Most shovel tests were excavated in soils where clay was evident at, or immediately below, the surface. No more than 18 shovel tests were deeper than 40 cmbs and none exceeded 65 cmbs. This was the result of encountering dense basal or Pleistocene clays, usually 20 or more centimeters above the final depth.

[1] This is generally considered deep enough to confirm that the shovel test has encountered deep basal or Pleistocene clay.

Only one historic site was found on Alignment 1 for 169 shovel tests. The historic site was determined to be the previously recorded 41HR321 and no further excavations were performed there. No prehistoric sites were found during the survey.

Between February 11and February 21 of 2002, an initial reconnaissance of 10 proposed alternative alignments for the Bayport Rail Loop was performed. This included visual inspection and shovel probes of all accessible corridors and driving or walking some portions of these corridors. Some portions of these alignments were inaccessible due to lack of right of entry. These alternatives add up to a total of approximately 47.7 kilometers. After examination of these routes, it was determined that as much as 48% of the total distance was in already disturbed soils. Again these disturbances took the form of pipeline ROW, roads, flood control channeling, as well as industrial sites and neighborhoods (including those currently under development). One alignment was determined to be 100% disturbed, and another entirely free of disturbance. The remaining eight alignments ranged from 20% to 75% disturbed.

The dominant soils within the proposed alternative alignments are Lake Charles clay, Beaumont clay, and Bernard/Bernard-Edna complex soils. There are smaller pockets of Midland silty clay loam, Vamont clay, and Addick loam (Wheeler 1976). Abbot (2001) considers all these soils to be of low geoarcheological potential. All these soils are somewhat poorly drained to poorly drained. The Edna aspect of the Bernard-Edna soils may contain pimple mounds and the Lake Charles and Beaumont clays may contain clay micro-knolls 6-12 inches above micro-depressions.

Of all previously recorded prehistoric sites within the general vicinity of the project area there is only one that was found more than 300 meters from a stream channel. This one exception is 41HR150, a small lithic scatter, which sits on a small mound adjacent to a pond. Even most historic sites within the general project area appear to be associated with streams, though not all. Other prehistoric sites included lithic and/or ceramic scatters and resource acquisition locations (i.e. shell middens). Historic sites included farmstead foundations and trash scatters. No recorded historic sites within the project corridor predate the early 20t^{h} century. Older editions of the USGS Quadrant maps (originally surveyed in 1915 & 1916) showed no structures within the proposed alternative alignments.

Close examination was made of aerial photographs from a number of sources. The oldest was the 1972 series from the soil manual for Harris County (Wheeler 1976). A series of snapshot aerials from the late 1990's and the more recent aerial project maps supplied by the project manager were also examined. These aerials provided confirmation of disturbances within the project corridor and made visible many of the pimple mounds described in the Edna soil description. Evidence of pimple mounds could be seen in portions of Alignment 3 and Alignment 4 as well as small portions of the original option, Alignment 1. The aerial photographs also allowed limited examinations to be made of portions of the project corridor that could not be examined at all during the reconnaissance due to lack of right of entry.

I assessed the project corridors with respect to a hierarchy of environmental factors that combine to make a locality attractive for prehistoric settlement in inland Harris County (Moore 1995). The factors in combination simply constitute a set of "settlement rules" that define good campsites in similar environments. These include preferences for the following:

1. Site location in the floodplain or on the floodplain/upland margin.
2. Site locations in proximity to sources of potable water.
3. Site locations in forested environments.
4. Site locations on well-drained, loamy soils.
5. Site locations on topographic high points.
6. Site locations on geologic terraces in watersheds with broad 100-year floodplains. These terraces may range from 100 to 1000 meters wide and may be of Late Pleistocene age or younger. They thus represent good settings for the discovery of cultural remains as old as 10-12,000 years before present.
7. Site locations on the upland/floodplain margin typified by the Lissie and Beaumont slopes to streams with broad floodplains. As geologically old surfaces, these upland margins also present potentially good settings for prehistoric remains.

Distance to water is a dominant factor affecting the probability of finding prehistoric sites in southeast Texas. Most prehistoric sites are found within 300 meters of potable water. As discussed previously, all but one known prehistoric site is within 300 meters of a stream channel. The one exception is associated with a pond. There are at least 12 crossings of drainages by the alternative alignments under assessment. These include Horsepen Bayou, Armand Bayou, Willow Springs, Taylor Bayou, Little Cedar Bayou, and Spring Gully. However, many of these streams have been straightened and are no longer in their natural state or original beds.

The other dominant factors are for well-drained loamy soils and topographical high points. Within this project all of the soils are somewhat poorly drained or poorly drained, and most are entirely or predominantly clayey. Topographical high points are limited to the described pimple mounds and microknolls previously mentioned.

In conclusion, I recommend that the following modifications be made to the survey strategy for the alternative alignments.

1st – All segments of the proposed corridors which have been determined to be disturbed should be excluded from any further investigations.

2nd – Survey within 300 meters of stream channels should continue to follow the survey methodology utilized for Alignment 1. This includes a shovel test every 100 meters, and additional shovel testing (a minimum of 6) at streams crossings.

3rd – The remainder of accessible and undisturbed segments of the alternative alignments should be walked and visually surveyed for any historic properties. Additionally, shovel

tests should be performed on a sampling of pimple mounds, microknolls, or other raised features within the alignment corridors, especially those in relation to drainages and pond features.

It is felt that these changes will make the survey methodology more efficient in discovering cultural properties. I recommend that approximately 25 kilometers of the proposed corridors will be surveyed as recommended above, while some 23 kilometers (almost half) of disturbed segments be removed from consideration.

Please let me know at your earliest convenience if you concur with these recommendations or if you have any suggested modifications. We have been requested to conduct survey of the alternative alignments as soon as possible.

Thank you very much,

Douglas G. Mangum

Douglas G. Mangum
Project Archeologist
Moore Archeological Consulting

CC: Mr. Alan Summerville, ICF Consulting

CONCUR
by _____
for F. Lawerence [illegible]
State Historic Preservation Officer
Date 3-14-02

References Cited

Abbot, James T.
2001 *Houston Area Geoarcheology; A Framework for Archeological Investigation, Interpretation, and Cultural Resource Management in the Houston Highway District.* Texas Department of Transportation, Environmental Affairs Division, Archeological Studies Program, Report 27.

Moore, Roger W.
1995 *An Empirical Analysis of Elements of Prehistoric Site location and Formation In Harris County, Texas.* Moore Archeological Consulting, Report of Investigations, Number 149.

Wheeler, Frankie F.
1976 *Soil Survey of Harris County, Texas.* United States Department of Agriculture, Soil Conservation Service and Forest Service, and Texas Agricultural Experiment Station.

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